DOCUMENT RESUME

ED 259 719 IR 011 752

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TITLE Seeking Information on Interactive Video: The Information Sources and Strategies Used by Corporate Training Developers.
PUB DATE May 85
NOTE 185p.; Ed.D. Syracuse University.
PUB TYPE Dissertations/Theses - Doctoral Dissertations (041)

EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS *Industrial Training; *Information Seeking; Information Services; *Information Sources; Information Utilization; Interviews; Surveys; *Trainers; Training Methods; Videodisc Recordings; Videotape Recordings
IDENTIFIERS *Interactive Video

ABSTRACT

This study examines the specific information-seeking process and the information sources employed by corporate training developers and managers when considering the adoption and implementation of interactive video (tape or disc) as an instructional delivery system. Purposes include the identification of available sources of information on interactive video; information sources and strategies used; criteria that guide information source and search strategy selection; relative utility of the sources and strategies; and how variations among individual users, settings, and tasks affect the selection and utility of specific information sources and strategies. Analysis of data from interviews with training development personnel in 20 diverse corporations indicates that the most common information sources include vendors, consultants, and other corporate trainers, with personal contact being the primary information source, and "networking" the most common search strategy. In addition, it was found that the adoption of interactive video for training is occurring at a slow pace; information on interactive video is difficult to find; and available information sources are often inadequate to meet the needs of corporate training developers. The interview guide used and a list of resources for information on interactive video are appended. (Author/JB)

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SEEKING INFORMATION ON INTERACTIVE VIDEO:

THE INFORMATION SOURCES AND STRATEGIES USED BY CORPORATE TRAINING DEVELOPERS

by

Lois Maxine McLean

B.A., California State University Chico, 1971
M.A., Boise State University, Boise, Idaho, 1977

ABSTRACT OF DISSERTATION

Submitted in partial fulfillment of the requirements for the degree of
Doctor of Education in Instructional Design, Development, and Evaluation
in the School of Education at Syracuse University.

May 1985

Approved _____

Date April 26, 1985

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ACKNOWLEDGEMENTS

This study would not have been possible without the encouragement, cooperation, and support of many people. A very special thanks goes to my committee chairperson Dr. John Eggert, who provided invaluable insight, advice, and assistance throughout the study, from the first ideas for the proposal through the final drafts. I am indebted to Dr. Philip Doughty and Dr. Donald Ely, who have also been consistently helpful in their discussions with me and in the suggestions they have offered about the design, methodology, and analysis of the study.

I cannot adequately express my gratitude to the subjects who participated in this study. Because they have been promised confidentiality, they cannot be specifically named. However, without exception, I have been continually impressed by their willingness to devote considerable time to discussion of the research topics and by their thoughtful and articulate responses to the interview questions. They provided a rich collection of insights into the processes of information-seeking and technological innovation that is impossible to capture completely in this dissertation.

Additional individuals and organizations that have helped to make this study successful include Dr. John Ittelson, California State University at Chico, who proved to me that sometimes information is right in one's own "backyard"; Joseph Durzo and Digital Equipment Corporation for their interest in and financial support of my study;

Joseph Faust; Jeff Kemph; Dr. Edward Schneider; Frank McLaughlin, who first showed me a videodisc program; and the many vendors, salespersons, publishers, and trainers who suggested potential subjects or offered advice.

Personally, I also must thank the members of my family and my friends in the department, Syracuse, and elsewhere who have encouraged me during the study and throughout my stay in Syracuse. In particular, I never would have perservered without the support and friendship of Francine Vanous, Janet Massman, Eric Malone (for comic relief), Barb Petry, Don Parks, David Will, and Jeff York. I also am grateful to the staff of the ERIC Clearinghouse for their assistance and their moral and technological support.

Finally, this dissertation is dedicated to Richard Tessman, my information source and partner, who knows what IT means to me, for his ongoing friendship, encouragement, and focus, and his persistent faith that the future is indeed open wide.

ABSTRACT

This study examines the specific information-seeking process and the information sources employed by corporate training developers and managers when considering the adoption and implementation of interactive video (tape or disc) as an instructional delivery system. Purposes included the identification of available sources of information on interactive video; information sources and strategies used; criteria that guide information source and search strategy selection; relative utility of the sources and strategies; and how variations among individual users, settings, and tasks affect the selection and utility of specific information sources and strategies.

In-depth interviews were conducted with training development personnel in 20 diverse corporations in the San Francisco Bay/Silicon Valley and Los Angeles areas, in Syracuse and Central New York, and by telephone with individuals in Georgia, New York City, Illinois, and New Jersey.

Interview transcripts were coded by characteristics of individuals, corporations, training departments, interactive video projects, decision making processes and concerns, and by the information sources used, preferred, and recommended.

The sample varies in characteristics of the subjects, settings, and the specific application and implementation of interactive video but is similar in terms of the information sources and search strategies employed and preferred. Personal contacts are the primary information source and "networking" the most common search strategy. The most

common information sources include vendors, consultants, and other corporate trainers. Vendors can often discuss specific systems but are perceived as being limited in their ability to discuss applications of interactive video in the training setting. Trainers in similar settings who have experienced interactive video are ideal sources, but may be difficult to find. Publications are generally considered too general and are more useful for providing overviews.

It is concluded that the adoption of interactive video for training is occurring at a slow pace; information on interactive video is difficult to find and available information sources are often inadequate to meet the information requirements of corporate training developers; and information requirements and perceptions about sources and strategies change with the growth of the technology and the phase in the innovation-decision process.

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CHAPTER I.

PROBLEM STATEMENT

Overview

In order to provide guidance for both information providers and information users, the information-seeking process and information sources employed by corporate training developers (including training managers) when making decisions on the adoption and implementation of interactive video (tape or disc) as an instructional delivery system were studied through in-depth interviews conducted during the period of November 1984 through March 1985. Subjects were selected to represent diversity in terms of characteristics of the individual, the settings, and the purpose or task for which they sought information.

This report includes an overview and specific statement of the study problem and purpose (Chapter I); a review of the literature on technology and training, the adoption of innovations, information seeking, and interactive video (Chapter II); a description of the study methodology (Chapter III); a report and analysis of the study findings (Chapter IV); and recommendations for potential information seekers and information providers in this context (Chapter V).

The first chapter sets the context for the study and provides background information on the problem. A brief overview of factors related to the problem discusses the growth of new technology and the impact of new technology on training, the problems involved in keeping

up with that growth, information users as consumers, and the role of information in the adoption of innovations. Possible individual differences influencing information-seeking strategies and information sources used are suggested. Interactive video and its applications in training, and the availability of information on interactive video are also briefly addressed. The problem and the purpose of the study are then detailed. A list of definitions concludes the chapter.

Background of the Problem

This study is concerned with the process of seeking information on new technologies. Because interactive video is a relatively new technology which has only recently been utilized as a training medium, it offers a unique opportunity to study information seeking in a specific context. In light of the predicted growth in training and in the potential applications of interactive videotape and videodisc, it can also be reasonably predicted that such information seeking will be undertaken by many others in the near future, and that finding information on new technologies will become increasingly important in the corporate training development setting.

Recent technological advances such as the development of the microchip and laser have had a profound impact on many aspects of modern society. Such advances have made possible a variety of innovative practices in applied fields, including medicine, engineering, and education. Adoption and implementation of an innovation, however, require access to useful, relevant information in order to make

decisions that may affect the success of the project or lead to trial/acceptance or rejection.

Technological advancement can be viewed as having a paradoxical effect on the ability of corporate training developers to stay current and apply new technologies to their settings. On the one hand, advances in communications technology have made it possible to access information in a variety of ways, for example, through the use of online databases or teleconferencing. On the other hand, the proliferation of information in general and of technology in particular and the rapid development of some technologies have made it difficult to keep up with developments as they occur. "Trying to keep up with the leading edge technologies and their profound implications is difficult at best" (Butler, November 1982, p. 68).

Individuals seeking information on new technologies can be considered "information consumers." They may have actively sought information to determine if a new technology would help them to solve a particular problem, or they may have become interested in the technology first and then looked for a problem that it might help them solve. As consumers of information, individuals may have particular preferences regarding information. For example, they may require a specific type of information to solve a particular problem or may prefer a particular information format, such as a seminar or reference book.

Individuals interested in adopting and implementing new technologies for instruction in training settings require information to make a variety of decisions. This information may be accessed in

different ways, through a variety of sources. The options selected by an individual (whether consciously or unconsciously) for informing their decisions may be influenced by factors related to the individual, the setting, the task, and the information source. In addition to the variation in the sources used, individuals may also vary in the strategies used or the ways in which they access the sources. For example, they may go to a particular source for certain basic information and then to others to expand on the initial findings. They may select many sources from a variety of disciplines, or use a single consultant to do the research for them.

Within the fields of education and training, a current example of technological advancement with implications for instructional innovation is the merging of microcomputer, laser, and video technologies to allow the creation of "interactive" video programs. Adoption and implementation of such programs might require information on hardware configurations, authoring languages, special attributes of the media, computer programming, instructional design, costs, management, facilities, scheduling, and learner characteristics. Some of this information would be available within an organization and some would most likely have to be sought outside the organization. Information on interactive video appears to be available through hardware companies, journal articles, private consultants, workshops, conferences, and a variety of other sources, which will be determined in the course of this study.

It may be that, as a new technology emerges, the supply of information is inadequate for the demand, either in the number of sources available, the type of information available, or the ways in which the information can be accessed. For example, Wilson (1983) suggests that one reason interactive video, although a "hot" topic in training, has not been used as often as might be expected, is that some trainers are confused on the nature and the training potential of interactive video and have insufficient information to make informed purchasing decisions. It is also possible that commonly-used search strategies and sources of information, which may have been effective in helping to address past problems, may be inadequate in the context of instructional innovation and rapidly-evolving, new technologies. This study was particularly designed to identify the most effective information-seeking strategies and information sources for potential users of interactive video in corporate training settings.

The Problem

Although advances in computer, video, and laser technologies have made interactive video an exciting option for training delivery, the adoption and implementation of a new technology require that a series of decisions be made. These decisions must be based on the best available information. In the case of new technologies, however, information for decision-making may be difficult to find or may require innovative search strategies. Therefore, information seekers should be aware of source and strategy options available to them, and information providers should be aware of what type of information in what format is of most

utility to information users. Although information seeking and use studies have been conducted in a variety of disciplines and settings, there is little evidence to suggest how this process works in the context of corporate training and what information sources and strategies might be most useful to such potential information seekers. The study is also important because it emphasizes information seeking within the context of technological innovation.

Purpose

This study, therefore, examines the information-seeking process employed by corporate training developers when making decisions on the adoption and implementation of interactive video (tape or disc) as an instructional delivery system. The unit of study is individuals within the training department and their role in information-seeking. The focus is on these individuals, primarily corporate training developers and managers, rather than the corporation in which they work, although the corporation is important in establishing the context for the information seeking. Within the context of corporate training, the study is specifically designed to identify the following:

(1) The available sources of information on interactive video;

(2) The information sources and strategies used;

(3) The criteria that guide information source and search strategy selection;

(4) The relative utility of the sources and strategies selected and used; and

(5) How variations among individual users, settings, and tasks, affect the selection and utility of specific information sources and strategies.

It is anticipated that the results of the study will be used to provide potential information users in the area of interactive video (and possibly other technological innovations) with guidance on the information-seeking options (the sources and strategies) available to them and the potential utility of those options within specific contexts, and to supply information providers with an understanding of user source preferences and requirements.

Theory in information studies and instructional technology will be used to provide a conceptual framework. In particular, studies on information seeking and use appear helpful in determining possible factors affecting and influencing information seeking and in formulating an appropriate methodology. Also of particular interest is the literature on the adoption of innovations and on technology transfer. These and other studies will be reviewed in the following chapter.

Definitions

Corporate Training. Corporate training refers to the instruction provided to personnel in business and industrial settings by their employer. This training is generally designed to teach employees a specific skill or procedure that is directly related to their job requirements.

Corporate Training Developers. Corporate training developers are those individuals in business or industrial corporations who are responsible for planning, developing, managing, and/or implementing personnel training programs. Their duties may range from management of training departments to actual classroom instruction. These individuals may also be called human resource development specialists, instructional technologists, training managers, or simply trainers, although "trainers" implies less involvement in course development and more in direct instruction. For the purposes of this paper, however, the generic terms "developers" and "trainers" will be used in some cases for the purposes of simplification. The role of individuals in corporate training and decision making is of more interest in this study than their particular titles.

Information sources. Information sources include people, places and events (such as seminars or conferences), and materials (such as publications) used to obtain information.

Information Seeking Strategies. Strategies are the ways in which information sources are sought or accessed. They also refer to such

aspects of information seeking as depth versus breadth, and the sequence or approach followed in information seeking.

Information providers. Information providers are primarily individuals or organizations that take an active or formal role in delivering or offering information to users. Examples of information providers include hardware vendors, consultants, academic institutions, dissemination projects, workshop sponsors, or publishers.

Instructional Technology. Instructional technology refers to both the systematic design, development, and evaluation of educational programs and materials and the use of various media to provide such instruction.

Interactive Video. Interactive video involves the control of a video format by a computer or microprocessor. In this paper, interactive video will refer to computer-controlled videotape systems as well as interactive laser videodisc systems.

Technology. Technology is the application of research findings or science to practical problems.

Technology Transfer. Technology transfer is the process involved in disseminating the findings and discoveries of science and research so that they can be applied in practical settings.

CHAPTER II.

REVIEW OF THE LITERATURE

A review of the literature was conducted to examine prior research and viewpoints that would be useful for guiding the development of this study. This review covered perspectives from the fields of information science, instructional technology, and human resource development and training. The growth and spread of new technology, and particularly the potential of interactive video, were also examined. Specifically, the review attempted to discover whether similar studies have been conducted, the factors which should be considered in a study of information seeking in the context of innovation, and methodological considerations in conducting such studies.

Chapter II begins with a look at the impact of new technology on society, followed by a discussion of the literature regarding technology transfer and the dissemination and adoption of innovations. A section on technology in training includes background information on training, as well as a discussion of corporate training's projected growth, roles of trainers, and the growth of applications of technology and of media use in training. A discussion of interactive video includes a brief overview of the medium's capabilities, the types of problems and issues involved in its application, its projected use in training, and the tendency for potential users to focus on or be awed by the hardware

requirements or complexity of interactive video. Literature on information studies and information seeking is reviewed to identify potentially-important characteristics of the user, setting, information format, tasks or problems, and user criteria for information sources that should be adddressed in the interview questions. A search of the literature on trainers as information users indicates a lack of research in this specific area.

The literature on technology transfer, the dissemination of innovations, and the innovation-decision process are relevant to this study because (1) interactive video in training settings can be considered an example of technology transfer; (2) interactive video can be considered an innovation as defined by Rogers and Shoemaker (1971): "An innovation is an idea, practice, or object perceived as new by an individual;" (3) information on interactive video reaches practitioners from a variety of sources through a variety of means, but the process probably follows a pattern similar to that of other innovations; and (4) individuals considering interactive video as a training delivery system may be categorized by phases in the adoption process, and the information strategies and sources used may vary according to those phases.

Technology Transfer and the Dissemination of Innovations

> We are experiencing an increase in the rate of innovation unprecedented in human history, what some scientists now call spiral evolution. (Butler, November 1982, p. 65)

Technogical advancement is having a strong impact on our society. A review of articles in magazines such as Training and Instructional Innovator in the fields of education, training, and instructional technology, in particular, indicates a strong interest in potential applications of technology as well as a proliferation of predictions about the changes this advancement will create in training and education. For example, a variety of new publications have been introduced (such as Electronic Learning and The Videodisc Monitor) within the last few years, and major conferences of the type sponsored by The American Society for Training and Development (ASTD) and Training Magazine have devoted sessions to technology in education.

For this study, as previously mentioned, it was important to look at the literature on technology transfer, which refers to the application of a technology outside of its original setting or place of discovery. For example, a technology may be developed in a research setting, but must be introduced into outside settings to effect any impact on actual practice. In some cases, a technology may have applications in realms outside of those originally anticipated. The technological developments resulting from the space exploration program provide evidence of this phenomenon. In the case of interactive videodisc, initial interest in its development was in its use as a data storage medium, rather than its application as an interactive learning tool (Butterfield Communications Group, 1983).

The process of technology transfer requires some type of linkage between the research or original setting and the context in which it

will be used. This process can be instigated by either the originator of the technology or the user of the technology. For example, a researcher may actively disseminate information on findings to an audience expected to be interested, or someone with a requirement for a type of technology may make an active search to find out what research or development has been done in the field.

Although no research was found that deals specifically with seeking information on interactive video, research has been conducted on the transfer of technology and on the dissemination of innovations. That literature was reviewed briefly to identify the relevant factors involved in the transfer of technology from its origination to its application and the dissemination of innovations process as it might relate to interactive video for training. Interactive video is an innovation, in that it has such capabilities as random access, use of both still frame and motion sequences, computerized control, and high-volume storage of single frames, which have not previously been available for video-based programs. Its application in training departments is also an example of technology transfer, in that it requires the use of newly-developed, sophisticated technical equipment.

In an extensive review of the utilization of knowledge, Glaser, Abelson, and Garrison (1983) conclude that the way in which research findings are disseminated affects the likelihood of their being applied. For example, strategies which are effective in speeding the dissemination of knowledge on new technologies (and therefore the

likelihood of their application) include writing conferences with published conference proceedings and a series of annual meetings focused on a topic of central concern to a particular group, demonstrations, site visits to observe innovations in settings similar to those where the visitors work, and exchange of personnel.

Publications and other written materials can also increase the likelihood of an innovative process being advanced. However, problems related to publishing costs, slow speed of response (from time of discovery to publication), and poor quality of materials, have often made written materials less desirable for technology transfer purposes than personal contacts.

Informal, familiar sources are often used in the dissemination of information on innovations. Glaser et al. (1983) mention one study by Ryan and Gross in 1943 which considered the diffusion of hybrid seed corn and indicated that a salesman was the first means of contact and introduced the idea, but that neighbors were most influential in the actual adoption. Practitioners tend to rely on other practitioners. Most adopted innovations do not result from research reports, which are rarely read by practitioners, but instead from other practitioners. They conclude that "interactive communication is the salient feature of the social system in research and the pursuit of knowledge" (p. 311). In fact, they also report a study by Collins which suggests that the informal communication network in scientific laboratories in the United States and Canada can be viewed from the perspective of a sociometric chart.

In one of the most comprehensive studies of the diffusion of innovations, Rogers and Shoemaker (1971) indicate that the critical elements of such studies include the innovation itself, the channel(s) by which it is communicated, the time period involved in its diffusion, and the members of the social system involved in the process. They note that it is the time element necessary for diffusion to occur that distinguishes research on the diffusion of innovations from other communications research, although the basic model is similar to most general communication models (p. 18). Communications research does not generally distinguish the information source from the information delivery channel. It often uses recall data from personal interviews to determine how users learned about an innovation, although the original source, which for technological innovations is ultimately a scientist, may be unknown to them (p. 19).

Glaser et al. (1983) offer a succinct summary of key factors that bear on the knowledge tranfer process, including (1) characteristics of the type of knowledge to be transferred; (2) characteristics and settings of potential users; (3) manner and extent of dissemination; and (4) facilitating and inhibiting forces bearing on the given transfer effort (p. 419). They also suggest that new ways are required to effectively disseminate the findings of research and demonstration projects and validated exemplary practices.

Adoption of Innovations

Another branch of the literature in this area deals with stages in

the adoption of an innovation or the innovation-decision process. Rogers and Shoemaker (1971) identify five phases in the process as they have been conceptualized by many diffusion researchers: (1) awareness or first knowledge of a new idea; (2) interest or gaining more knowledge about the idea; (3) evaluation or establishing a favorable or unfavorable attitude toward the idea; (4) small-scale trial; and (5) adoption or rejection decision. They, however, have developed their own four-phase process which includes (1) knowledge; (2) persuasion; (3) decision; and (4) confirmation:

> The knowledge function occurs when the individual is exposed to the innovation's existence and gains some understanding of how it functions. The persuasion function occurs when the individual forms a favorable or unfavorable attitude toward the innovation. The decision function occurs when the individual engages in activities which lead to a choice to adopt or reject the innovation. The confirmation function occurs when the individual seeks reinforcement for the innovation-decision he has made, but he may reverse his previous decision if exposed to conflicting messages about the innovation. (p. 25)

The adoption of an innovation may be either an individual or a group decision, occurring over a period of time and varying according to characteristics of the innovation, the individual, and the organization or setting in which it is to be applied. (Landau, Maddock, Shoemaker, and Costello, 1982)

Individuals may differ in their degree of innovativeness. Rogers and Shoemaker describe five adopter categories: innovators, early adopters, early majority, late majority, and laggards. These categories are dependent upon when an innovation is adopted in its diffusion process (p. 27). Individuals can also belong to several social systems with different degrees of social or modern orientation. This joint

affiliation with various social systems can cause pressure on the individual when making decisions, particularly if the decision conflicts with one social system's values.

Factors in the organization may also affect the transfer of technology or innovations, such as the ways in which decisions are made, the formal and informal communications channel favored, and management attitudes toward change.

Sometimes the use of a new idea is viewed instead in terms of its costs. Glaser et al. note that Firestone (in a 1977 article) suggests that effective change must be based on sophisticated understanding by those in power positions of the costs and benefits of that change.

> Yet a decision to innovate may also be be made on less than an objective or rational basis or for individual careerist reasons. Innovations are often selected without adequate consideration of how they will contribute to the solution of identified problems in particular or local settings. (p. 58)

Characteristics of the innovation can affect adoption. Rate of adoption, for example, is influenced by the perceived characteristics of relative advantage, compatability (with existing values, past experience, receiver needs); complexity (how difficult the innovation is to understand or use); triability or the degree of experimentation available; and observability (to others) (Rogers and Shoemaker, 1971).

A model developed by Landau, Maddock, Shoemaker, and Costello (1982) links the application of the innovation decision-making process of Rogers and Shoemaker to the transfer of information on innovations. The model suggests that user needs for information and the information

products best suited to meeting those needs vary systematically in accordance with the phases of awareness/knowledge, attitude formation/persuasion, trial/decision, and confirmation.

Landau et al. describe how the model was applied to information on environmental pollution control technology to identify how various user requirements can be satisfied by different information outputs and services. They suggest that the model could be applied in any applications area, comment on the limited knowledge available regarding technology transfer, and state the need for a conceptual framework to provide a method to identify and describe the key elements of an information transfer system as including "information users, user needs, output packages, package promotions, and package delivery" (p. 82). Their model suggests that information products should be designed to be relevant to the user in each innovation-decision phase and should direct the user to the information needed to move to the next phase. They also indicate that information products should become more specific and personal as one moves through the innovation-decision process.

One of the first decisions that must be made by anyone considering the adoption of an innovative technology is whether the technology will assist in solving a particular problem at hand. (Of course, there are likely to be situations where the decision to adopt may not be related to the requirement for a solution, but instead will be based on a desire to experiment with the technology, or even just to "keep up" with technology or with the competition).

Decisions to adopt interactive video as a training delivery system

may be made on a variety of levels, from whether to buy a computer interface for existing videotape equipment and using an existing videotape to create an "interactive" program, to purchasing and designing a complete, computer-based training system, which may also be integrated into a total automation plan for corporate management, data processing and training.

In some corporations, the adoption of a new technology may follow formal procedures, while in other cases, adoption may be related to the individual interests of training department personnel. Dennis (1984) discusses the formal process for the adoption of new technology at Arthur Andersen and Company, and describes the use of a Technology Life Cycle Model, which has the following steps or phases: (1) definition; (2) research; (3) introduction; (4) growth; (5) maturity; and (6) decline/update.

Technology in Training

Literature on technology and training and the role and current status of training in general was reviewed to establish the importance of the study, to look at the impact of new technology on training, and to identify any common procedures for adoption of technology specific to training.

This review indicated that trainers are being confronted with a variety of technological innovations that are creating changes in traditional media, new teaching methods and management systems, and new approaches to instructional delivery systems. At the same time,

training departments are being challenged to play an important role in increasing productivity and are as innundated with information as are other professionals.

In 1981, Gayeski reported that training in business and industry was growing rapidly, with 3.7 million people in 1980 having had in-house training courses and that the need for trainers was increasing (p. 60).

The roles of trainers in business and industry may include those of learning specialist, consultant, program manager, and administrator. Most training and material developers can be considered to have entered the field through nonacademic routes, being either "retreaded teachers, displaced broadcasters, or promoted managers" (Gayeski, 1981; Nadler, 1980).

Nadler also suggests that trainers can be categorized as either (1) professionally identified with a human resource development organization; (2) defined by organizational experience rather than training experience; and (3) those with collateral duties in personnel, safety, or as line managers and supervisors. Nadler identifies trainers' duties as those of learning specialist (facilitator of learning, curriculum builder, instructional strategies developer); administrator (developer of Human Resources Development (HRD) personnel, supervisor of HRD programs, maintainer of relations, and arranger of facilities and finance); consultant (advocate, expert, stimulator, change agent); or other (p. 16). Chris Lee, associate editor of Training magazine (January 1984) predicts that trainers will be required

to obtain professional certification before the end of the 1980's. Swanson (1983) describes the role of human perfomance technologists as being concerned with how things could be improved in an organization in regard to individual or collective performance. The role focuses on the definition and solution of problems. "Another way of viewing our role is to think of ourselves as professionals who create the artificial in an already artificial environment for the purpose of enhancing human performance" (p. 2).

In a 1983 survey, the number of full-time trainers in United States organizations with more than 50 employees was 232,121, a 9% hike over the previous year (Training, December 1983, p. 132). Reasons for this increase in training are cited in various sources as being due to the need to train more employees to use new technologies and the increasing pressure on business and industry to build productivity while streamlining costs. There is evidence to indicate that new technology has influenced and will continue to influence the way that training is developed and implemented in business and industry. Butler (December 1982) suggests that training departments will be increasingly challenged to provide effective instruction to a more demanding population, while confronting management's disillusionment with past training efforts as well of a lack of organizational commitment to "quality and training and development programs" and cutbacks in resources (p. 51)

Evidence also indicates that media use in companies is growing. A survey by Vaughn (1980) found that 60% of 113 companies questioned expected expansion of their audiovisual services in the five years

following the survey. Size of the training and development staff, not including instructional designers, was directly proportional to the company or division size. Most training involved individual or small-group instruction at decentralized on-site locations. At the time of Vaughn's survey, 80% of the corporations were using video in training, but fewer than 10% were using computer-based training, although a strong belief that microcomputer use would soon increase in training was expressed by the respondents (p. 26).

Another study by the Human Resources Research Organization (HumRRO) in 1981 of 160 "Fortune 500" companies indicated that, based on 56 responses, half of the corporations were using computers in training, with 20 of those using microcomputers, often in addition to mainframe computer use (Hart, 1983). Computer-based training was most often used to support technical training and used a broad range of approaches, hardware, systems, and training areas. Data on computer-based training use in business and industry is fragmentary. However, the diversity of applications indicates that companies are willing to experiment and that there are imperatives for companies to try such training (Hart, p. 20).

As mentioned in the previous section on adoption of innovations, Arthur Andersen and Company has taken a systematic approach to dealing with new technologies for training. They are particularly interested in computer assisted instruction, computer managed instruction, interactive video, and teleconferencing to make training more effective, available, consistent, and less expensive (Dennis, 1984, p. 6). For example, they

are using microcomputer simulations to train employees to work with microcomputers. In 1984, videodisc was considered to be in the research phase and computer assisted instruction in the growth phase of the Technology Life Cycle. They recognize that integrating a new technology into an organization's training program requires changes in the educational practice of that organization, and they used planned activities to manage that change:

> Once we identify a technology as being potentially useful in addressing business training needs, we develop a plan of action to bring about the use of the technology. We need a logical and organized approach so we can obtain the benefits of the new technology. The approach to implementing a new technology should compensate for the initial lack of experience with the technology. The approach should also include ways of 'selling' the new technology to the organization in general and to the training development teams in particular. (p. 10)

A 1984 article in Training states that reliability and affordability are the primary characteristics of both hard and soft new technologies that have produced lasting and meaningful changes in training, and that both microcomputers and videodisc equipment are reaching the "critical mass" stage of both.

> In terms of cost-effectiveness the computer end may be ahead of the video end at this point, but the two together are laying the hardware foundation for forms of integrated, single-screen computer-based training the likes of which we've only dreamed of. (pp. 12-13)

Computer use is likely to increase, despite past problems, because of recent technological advances and business environment changes. "A host of factors once seen as constraints on the use of technology for training, now appear to propel some companies boldly into computer-based

training" (Hart, 1983, p. 20). Reasons for the growth of computer use in training include reduced costs of microcomputers with accompanying increases in the computer's power, user-friendly interfaces, a variety of networks available, embedded training (computers within equipment), better-designed authoring languages, acceptance of technology in everyday life, the presence of the "Office of the Future" and the Office Information Systems concept, and

> the simultaneous, but unrelated, greater involvement of instructional technology professionals in the development of computer based training. Both phenomena are difficult to quantify, much less prove. The greater acceptance of instructional systems development and criterion-referenced instructional approaches in business and industry training leads one to assert the increasing systematization of training. (p. 22)

The sophistication of training technology materials and equipment does vary from corporation to corporation, more than it does in education, for example. This variation could result from economics, competition, quality of management, nature of products or services, and competence of training staff. (Nitsos, 1981, p. 17)

Interactive Video

One of the new technologies that has implications for many aspects of society, but particularly for education and training, is interactive video. Video has traditionally been considered a linear format; that is, a video production has a beginning, middle, and end, and proceeds logically through time in a sequence planned by the writers and producer/directors. Viewers or learners have generally had little

involvement or choice except to turn a program on or off. Technology has made possible a new way to use video, one that has the potential to increase television's power as a learning tool and to overcome the common criticism that it is too passive a medium. The ability to combine computer, video, and laser technologies has freed producers and designers from the linear format and provides the possibility of viewer or learner control and some active or interactive involvement with the program.

Interactive video involves the use of either a videodisc player with an internal microprocessor, or a videotape or videodisc player with an external computer connected to the tape or disc player by an interface component. Interactive videodisc has the capabilities of storing up to 54,000 still frames on each side or up to 30 minutes of motion (depending on the number of still frames used), random access of individual frames, slow motion and single frame advance in forward or reverse modes, and branching to particular frames or segments in response to viewer input or as a result of a particular response. Videodiscs can combine the attributes of color, dual audio channels, graphics overlay, motion, and still pictures. There are several types of videodisc systems at present, but the primary ones in business and industrial settings use an optical laser format. Discs for this type of system are prepared by compiling a master videotape which is transferred to discs through a process that imprints the disc with microscopic "pits" which are "read" by the laser beam during play. Interactive videotape systems do not allow as rapid a segment access time as do

videodiscs and do not have such accurate still frame capabilities. They primarily allow the sequencing of particular motion segments through computer control. In some corporations, existing materials are being transferred to disc formats and existing linear videotapes are being made "interactive" with the addition of a computer program and interface system and the inclusion of a "location finding" time code inserted on the videotape.

Production of a videodisc in particular requires a team effort, utilizing the skills of instructional designers, video directors and producers, computer programmers, content experts, and scriptwriters, among others. This team effort may not have been so important in the past, when instructional designers did not necessarily need to understand the entire process involved in media development and dissemination (Worcester, 1983).

An unpublished study by J. Taylor Klotz (1983) surveyed attendees of symposiums and workshops sponsored by the Nebraska Videodisc Production/Design Group about their work in videodisc and the problems that were encountered in producing discs. Aspects addressed by the study included scripting, shooting, editing, text transfer, film transfer, computer programming, single frame edits, final transfer to video, video fields, and mastering or pressing. Problems discussed by respondents included those related to computer programming, visualizing interactivity, covering all production bases, design, scripting, mastering, frame accurate odd field edits, time delays, turn-around time, the material, and group production. In describing why they had

not used videodisc, one respondent stated

> We have made a recent commitment to a VHS distribution network and it would be difficult to change format. Also, we have not fully investigated the use of videodisc in our operation. Important factors to us--cost of producing, speed of producing, updating materials, program design, return on investment analysis on training dollar. (p. 35)

A variety of corporations have experimented and developed programs with videodisc technology including Ford Motor Company, General Motors, Boeing, Lockheed, AMC, Bank of America, and IBM.

A 1983 survey of potential applications for interactive videodisc in training settings was conducted by the Butterfield Communications Group for the Corporation for Public Broadcasting. They found that the size of the training market was difficult to estimate, but that industrial and government training expenditures in 1982 totalled $33 billion dollars, of which software expenditures constituted $6 billion, with $20 billion predicted by 1990. They identify the characteristics common to early videodisc users as being large companies, with large training tasks, and being technology-oriented (p. II-2). They predict that for the 4-5 years following the study, the training market will be the largest market for interactive videodiscs and project "the production of more than 250 interactive videodisc titles for training applications in 1984 and more than three times that in 1986," with nearly 10,000 discs projected by 1990. They segment the training market into the following categories with potential for videodisc applications: product service, product marketing, equipment operations, employee procedures, and generic. The most growth is predicted for the first three categories through the 1980's, and product service training and

product market training are expected to generate the most demand through the end of the decade (p. VIII-9).

> The application of interactive disc to these various training tasks will develop at different speeds. But growth in one application will spur growth in the others. One reason for this is the presence of the disc player itself. When a company invests in interactive disc training for one type of training it acquires an installed base of interactive players which can, and typically will, be used for other types of training.
>
> Two other points drawn from the preceding discussion bear reiteration. First, a company's or industry's initial shift to interactive disc training often depends upon the existence of a "window of opportunity." In the case of General Motors and Ford, the rapid multiplication of new models strained existing training methods; both mechanics and salespeople needed much more training to become acquainted with the new products. A window of opportunity was opened for a new training medium. Similarly, the exponential growth of the office automation equipment market produced a window of opportunity for interactive disc in that industry. Such developments make the cost of a new training medium easier to justify; it is bundled with the cost of meeting a new business situation.
>
> The second point worth repeating is that the use of interactive videodisc for training is likely to develop on an industry-by-industry basis, a pattern that has emerged in the automotive and computer industries. The industry leaders have adopted videodisc and the rest of the industry plans to follow. This pattern of development is particularly likely in instances where training becomes a competetive issue. For example, in the office automation industry the quality of customer training is a critical component of the product itself. (pp. II-28-29)

Ittelson (1984) also predicts that the combination of microcomputer and videodisc technologies to present well-designed courseware will produce effective training, although current courseware development systems still lag behind the capabilities of the technology.

The literature indicates that although the skills required for designing and developing interactive video programs may be similar to those involved in the design of other media programs, in that they should be based on learner needs and organizational goals, the design of

quality programs can be a complicated process requiring additional emphasis on front-end analysis and instructional design considerations. Wood (1982) also indicates that interactive videodisc cannot be considered to be simply a merging of video and computer media. "It is an entirely new medium with new characteristics quite unlike each of the composites" (p. 10). He is critical of the tendency to view new technologies in the same use patterns as those of traditional media and stresses that to make any real impact with videodisc will require new approaches to instructional design and development. Wilson (1983) echoes the opinion that developing programs for videodisc is a unique case, and that videodisc can even be considered an art rather than simply a new delivery system. Wood believes that the power of combined videodisc microcomputer technology is still not understood. "What videodisk is remains hidden. Because it imitates so well the media we have known to date, we tend to identify it in terms of other media, especially videotape. Videodisks true identity remains an enigma" (p. 10).

Indeed, the literature also indicates an almost mystical interest in videodisc as an unexplored and infinitely powerful medium. For example, John Messerschmitt of North American Philips (Conversation with John Messerschmitt, Videography, January 1984) believes that the videodisc will have a profound effect on education and training. He comments:

> I believe along with Buckminster Fuller, who stated shortly before he died, that when we look back on the twentieth century we will have to conclude that the marriage of the microcomputer and the

> optical videodisc will have been the most significant step in the century in terms of education and training. (p. 54)

Wise (1984), however, cautions against being overly impressed with the "things of learning" and comments that many of these things are selected not for instructional advantages but for logistic and operational benefits, and that their successful use depends less on the actual delivery system and more on the problem documentation, message design, and employee management after training.

A recurring theme in the literature review, was that new technologies are definitely being used in training settings and interest in their use will continue to grow. However, how these technologies are actually implemented to solve training problems appears to be the crucial issue:

> If the 'Third Wave' or 'Fourth Revolution' is upon us, if the old approaches to training and teaching no longer seem adequate and if institutional commitment seems weaker than it used to, it follows that new training technologies will have far reaching implications for both our programs and our careers. It all seems to boil down to one issue: the key to future success lies in how successful we will be in finding new solutions to old problems (Butler, December 1982, p. 51)

Ittelson (1984) suggests that videodisc technology is revolutionary, not so much in the presentation and technological aspects but in that it allows the research of learning theorists to actually be put into practice. "Interactive delivery systems have enabled us to worry less about the medium the materials are stored in and more about

the way they are presented and how they interact with one another" (p. 63).

Swanson (1983) stresses the need for a new vision and an expanded repertoire of skills in order to use the new technologies to enhance human performance. In summary, the use of interactive video appears to require some new skills, intensive front-end analysis, and some awareness and understanding of the capabilities of the technology in order to effectively apply it to problem solving in training and education.

Information Studies and Information Seeking

The literature review has revealed no studies that specifically address how individuals in the corporate training setting seek information on adopting or implementing new technologies. There have been studies of information-seeking behavior in other settings, however, which indicate that information seeking depends on factors related to the nature of the problem, decision, and purpose for which information is sought; the characteristics of the individual; the format or channel of the information source; and the setting or organization in which the individual works or lives.

The information studies literature includes a vast number of reports of research on information seeking and use. Some of this work has been based on the concept that in order to design effective information delivery systems, systems designers and information providers must understand the needs and behavior of the information

seeker and user. Several authors have summarized key findings of this literature, through their own extensive reviews.

Auster (1982) in a brief review of the literature on information seeking states that most studies have been conducted to determine "who needs what kind of information and for what reason; how information is found, evaluated, and used; and how these needs can be identified and satisfied." (p. 178) She also criticizes these studies, however, because of problems related to the use of limited techniques and diversity of subjects, poor design, and for not considering the complexity of the information-seeking process. The work of Paisley is also mentioned as establishing that the shallow conceptualization of many such investigations fail to consider the following factors:

> the full array of information sources that are available; the uses to which information will be put; the background, motiviation, professional orientation, and other characteristics of the user; the social, political, economic and other systems that powerfully affect the user and his work, and the consequences of information use--e.g. productivity. (p. 178)

In summarizing the work of Maurice Line on social scientists, she indicates that information needs should be classified by function, such as research, teaching and training, management, social work, and administration, and by environment or place of employment, such as academic institution, research organization, industry, government, and professional association.

Crawford (1978), in the Annual Review of Information Science and Technology, indicates that about 1,000 studies concerning use behavior and use of information systems had been conducted as of 1978. Such studies have included practical investigations of a variety of users

including lawyers, businesspeople, educators, and psychologists. Earlier studies concentrated largely on scientists and technologists. Crawford concludes that, although earlier investigations had considerable problems, a major advance was made when consideration was given to the information use environment and a distinction was made between cognitive and social aspects of information (pp. 71-72).

Summers, Matheson, Joyce, and Conry (1983) mention that prior reviews, such as those of Crawford, demonstrate a shift in research approaches from merely descriptive reports to more conceptual analyses of variables, in order to aid managers and policy makers in information decision making and to allow information products and services to be designed to meet the characteristics and needs of user groups. "However, much yet remains to be done in generating sophisticated descriptions of the information characteristics and behaviors of users in various professional domains and tailoring information services to their needs" (p. 76).

Faibisoff and Ely (1976) also conducted an extensive review of information use studies. They mention a previous review by Carter et. al. in 1967, which examined 58 studies primarily related to the scientific and technical community and identified behavioral patterns such as the principle of least effort, resistance to change, and preference for oral communication (p. 4).

They conclude that most such studies have used questionnaire and interview survey research methods, which can be questioned because of their dependence on subjects' recall of past behaviors. However, they

note that Carter recommends that interviews can be more effective if they ask the information user to focus only on a specific time period or project, in order to have them reflect on their behavior and not concentrate on their opinions.

Faibisoff and Ely draw some conclusions based on results mixing populations of scientists, social scientists, professionals, and the general public. They categorize these studies as relating to (1) user behavior; (2) the nature, amount, and source of the sought information; (3) the information quality; and (4) the information's timeliness (p. 9). They offer the following generalizations: (1) people tend to seek the most accessible information; (2) people tend to follow habitual information-seeking patterns; (3) information users and potential users are often unaware of sources and how to use them; (4) face-to-face communication is a primary information source; (5) different types of people use different information sources; (6) the nature and content of needed information is complex and varies from discipline to discipline and group to group; (7) users vary widely in the quantity of information required; (8) information quantity often exceeds the individual's capability to use it; (9) individuals' information needs change at different stages of their career and with changes in their projects; (10) the inability to locate information in formal or informal sources creates an information gap; (11) information service users are often dissatisfied with the assistance they receive and the quality of the services available; (12) information quantity and quality often have an inverse relationship; (13) information for routine, day-to-day decisions

and the information systems available are often inadequate; and (14) information should be timely, accessible, and relevant (pp. 9-11).

Some studies have looked at individual characteristics affecting information seeking. An Educational Information Market Study was conducted to identify educators' information needs in relation to preferred sources of information, purposes for needing the information, characteristics of preferred information sources, actual information products and services preferred, and problems encountered in information seeking (The Market for Educational Information, 1977, p. 5). Users were asked to rate the characteristics that they look for in first and second preferred information sources, using the following possible criteria: (1) likely to have the wanted information; (2) near at hand or easily accessible; (3) responsive to the particular problem or question; (4) easy to use; (5) usually available when needed; (6) keeps the user aware of new developments; (7) up to date; (8) provides for new ideas or different viewpoints; (9) authoritative, accurate, reliable; (10) leads to other sources; (11) provides opportunity to discuss or exchange ideas; (12) fast in responding; (13) complete, comprehensive; (14) free or inexpensive; and (15) objective, impartial, unbiased. The findings indicate that the market for educational information can be segmented by work roles, such as teacher or school board member, with different roles demonstrating different patterns in preference of information source, tolerance for delay in information delivery, purposes for information seeking, preferred characteristics of

information sources, preferences for information products and services, and problems in finding and using information.

The study also indicated that the reasons for choosing a source varied for first and second choices of sources. "In both first and second choices 'convenience' characteristics (likely to have the wanted information, is accessible, easy to use, is usually available) rank high; while characteristics such as comprehensiveness, low cost, and objectivity are consistently ranked very low" (p. 14) The conclusion is that after a user has decided that a primary source does not have the necessary information, additional sources are chosen on the basis of ease of access.

A 1979 study (Summers, et al., 1983) looked at the information needs, attitudes toward information, and information seeking behavior of public school educational practitioners in British Columbia, and particularly at educators' personal, professional, and psychological attributes and how they related to information seeking behavior. It also examined the dimensions of 13 information sources, desirable characteristics of information sources, and problems in seeking and using information. Attributes included nine different work roles, years of experience, sense of isolation from information sources, perception of the respondent as an information disseminator, and attitudes toward information. The following characteristics of information sources (very similar to those of the previous study) were listed for choice: (1) authoritative, accurate, and objective; (2) likely to have the information needed; (3) responsive to the problem;

(4) near at hand and usually available; (5) clear and comprehensive; (6) keeps the user aware of new developments; (7) easy to use; (8) provides a variety of viewpoints or discussion; (9) leads to other sources; (10) can be accessed without involving others; and (11) is free and inexpensive.

Position made a strong difference in sources used when they were organized by three clusters identified through factor analysis: close at hand traditional sources, less accessible print sources, and organized interpersonal sources. Although all characteristics of the information were considered relatively important, "free and inexpensive" and "provides access without involving others" were least important overall, and "is authoritative, accurate, reliable, and objective" and "is likely to have the information I need," were most important overall. Attitude but not position affected importance of characteristics.

As mentioned in a previous section, Landau et al. (1982) use the Rogers and Shoemaker model of the innovation-decision process to develop their own information transfer model, which suggests that information products have varied roles at various phases in the process. They believe that information should be targeted to individual user groups and the phase of the innovation decision process, particularly in the case of technology adoption. They define users in terms of four general characteristics: organizational type, organizational level, functional responsibility, and decision-making impact, (either low, medium, or high). In considering the subject content parameters, technical subject area and point of view are important, and the following factors are

important to the packaging parameter: media (channel), format, extent (breadth and depth), technical sophistication (minimal, moderate, high), temporal qualities (timeliness, frequency of issue), editorial (subjective, e.g. clarity) qualities, and information accuracy (p. 86). They provide examples of typical information packages, including print (brochures, press releases, newsletters, etc.), visual (displays, manned exhibits, motion picture, videotape), demonstration, and personal (professional conference, problem-oriented seminars, and technical assistance), by their appropriateness for the innovation decision process phases.

After reviewing the related literature, Mick, Lindsay, and Callahan (1980) state that the nearly 30-year tradition of information need and behavior research has focused largely on description and/or explanation of behavior. The research has identified many variables affecting information behavior, which can be organized according to the level at which they occur--either individual, environmental, or task. Most research has emphasized the individual level, employing variables that have little utility for information system designers or the management of information work. Their work was designed to develop a conceptual framework for viewing information behavior in a corporate environment, and suggests the importance of considering categories of variables, including individual tasks, job types, work environments, and organizational, institutional, structural, and cultural variables. Three dimensions of information were identified: (1) source or storage medium: books, periodicals, people, film-based media, magnetic media,

etc.; (2) access channel: telephone, library, information specialists, interpersonal, computer, mass media, etc.; and (3) content or type of information: theoretical knowledge, indexes, abstracts, summaries, how-to information, current awareness etc. In a study to test the model with scientists and engineers, "respondents were asked to rate variables along each dimension using five-point scales for frequency of use, perceived utility, perceived cost, ease of use, etc." (p. 351). They criticize the "Ptolemaic" view (of Paisley) which focuses on individual traits and suggest the adoption of a "Copernican" view of information behavior which considers individuals as part of various converging systems, influencing their information behavior but mostly beyond their control (p. 355).

> The information community needs to expand its scope and its horizons. It needs to conduct information behavior studies that consider the individual as an information consumer and producer, within the context of the total information environment. These studies must focus on utility, on providing data which can be used by management and system designers. Only then, when our information horizons are broadened, will our society truly be able to move into the information age (p. 356).

Trainers as Information Users

No prior studies were found that specifically looked at the information-seeking behavior of corporate training developers or the process of seeking information on new instructional technologies. One study by Ely (1981), however, did look at the information seeking behavior or needs of educational technologists in academic settings, at colleges and universities. He looked at the sources used and the preferred information format for current awareness of new developments

in the field and for the following specific purposes: preparation for teaching, writing a manuscript, preparing a speech, responding to a colleague's questions, case studies, and budget justification. Also surveyed were what professional journals are read, how they are used, and preferred formats for awareness and research information. Personal files and libraries were the primary information source for all purposes listed.

> For awareness, 64% of the respondents preferred professional journals, and 38% preferred specialized newsletters. For research information, abstracts and journal articles were equal; half preferred abstracts; half preferred articles. No one appeared to want complete research reports. (p. 8)

Ely cautions that needs for information and access to information probably differ from other groups in the field such as instructional developers and managers. He supports the need to investigate the information-seeking behavior of these other groups and to focus on a specific problem. Conclusions support the earlier generalizations of Faibisoff and Ely in that easy access, habitual patterns, face-to-face communication, and change with career stages and project stages influence information-seeking behavior (p. 9).

Berry (1984) stresses that the popular literature of the training profession indicates three areas of current interest: "(1) research and application regarding employee attitudes and motivation; (2) research in the development of instructional packages, programs, and workshops, and (3) cost-benefit analyses of media delivery systems for instruction" (p. 25).

Information on Interactive Video

In regard to videodiscs, Hoekema (1983) comments:

> One of the curious aspects about making interactive videodiscs is that no one in this field has been formally qualified for it. The technology is so new that, aside from a short workshop here and there (such as the excellent ones given by the University of Nebraska), the only way to learn how to produce an interactive videodisc is to produce one! Since we all come from some other background, it means that everyone involved in interactive video is learning one or more new disciplines--filmmaking, video technology, computer programming, instructional design, or the hodgepodge of human factors that link them all together. (p. 6)

An article in Training (December 1984) suggests that for many trainers, their first involvement with interactive video can be intimidating. "The hardware involved may be unfamiliar and the idea of constructing multiple 'branches' unfathomable" (p. 14).

A preliminary search, further developed during the course of this study, indicated that there are some possible sources of information and assistance on interactive video, however. These sources include several books, articles in both interactive video-specific journals or newsletters as well as those in training-related publications, specific interactive video conferences and sessions at professional training association conferences, consulting services (some of which are offered by vendors), classes at several universities, and even one online consulting business. Wood (1982), however, stresses the need for the development of both formal and informal information dissemination channels for interactive videodisc:

> The speed at which changes in videodisk and microcomputer technology are occurring is staggering. One's knowledge of the technology can become obsolete in a six-month period unless

constantly tended. To remain a viable designer of VMT instructional materials, a person must ensure a constant flow of quality information. The rapid expansion of knowledge and the rate of innovation has made the traditional sources and the means of using those sources inadequate. Literature reviews, attendance at annual meetings, and current periodical reading leave today's instructional designer and manager at least a year or even two years out of touch with changes in software and hardware technology. Educators, trainers, instructional and information scientists are at this time writing the future history line by line and chapter by chapter of the diffusion of videodisk-microcomputer technology learning systems and applications by their actions, reactions, or inactions. Only through the cooperative efforts of all of us will the new dimensions for computer based education provided through the videodisks and microcomputers be realized. (p. 11)

Summary

The literature review has established that technological innovation is indeed a prominent issue in corporate training and that interactive video appears to be under consideration as a possible training medium in many corporations and organizations. It also appears, based on this review, that the development and implementation of interactive video programs may require skills other than those commonly required for training developers, particularly those previously involved with linear video program development, and may involve a unique or complex set of problems and decisions. In order to be able to make informed decisions on the adoption and implementation of new technologies, trainers may require information from outside sources to help them deal with the complexities of new training systems such as interactive video.

The use of interactive video as a delivery system for corporate training programs may be considered as an example of technology transfer and as an adoption of an innovation. Therefore, it is anticipated that its adoption and implementation will have some similarities to the processes identified in the innovation and technology transfer literature.

Studies of information seeking have been conducted in a variety of settings, but have apparently not been conducted in the context of corporate training. How individuals in such settings seek information on new technologies has also not been identified through a literature review, although studies of other information seekers can provide some insights. Research on information seeking and information use conducted

in varied settings has indicated that such studies should consider the information users, their purposes in searching for information such as specific project tasks or problems, the organizational context or social system in which the information user operates, and the format of the information.

The literature review was used as the basis for development of an approach to studying the problem of information-seeking in the corporate training setting and to guide development of an appropriate methodology. The methodology that was selected reflects the literature on technology transfer, corporate trainers, the adoption of innovations, and information-seeking and use. That methodology is detailed in the following chapter.

CHAPTER III.

METHODOLOGY

This chapter describes the methodology selected to study the problem of information seeking in the context of corporate training and technological innovation and change, specifically interactive video. Following a brief restatement of the study purpose and focus, the research questions guiding the data collection, analysis, and reporting processes are listed. Procedures for sampling, identifying subjects, and gathering data are described. Results of initial pilot interviews are reported. The specific research procedures planned are then reviewed, as well as the data analysis methods.

Overview

This study seeks to understand the information-seeking process in the context of technological innovation. The sample is a group of corporate training developers involved in making decisions on the adoption and implementation of interactive video (tape or disc) as an instructional delivery system. Results and conclusions are based on a final subject total of 20 corporate training personnel representing diversity in terms of company size, company type, geographical location, interactive video application, and level of adoption. The primary unit of study is the individual involved with the training

development/management process rather than the specific corporation itself, although individuals must necessarily be considered in the context of their work environment. Focus is on the information seeker/user, the information sources and strategies available and those used, the criteria for selecting information sources and information seeking strategies, and the utility of information sources and strategies in the context of corporate training and the adoption of new training technologies.

Research Questions

The following questions were developed to guide the data collection, analysis, and reporting process:

1. What information sources and information-seeking strategies are available for corporate training developers who are seeking information on a technological innovation such as interactive video?
2. What information sources and information-seeking strategies are selected and used by these individuals?
3. What criteria or perceived information source and strategy attributes guide the selection and use of an information source?
4. According to these criteria, how do specific information sources and strategies "rate"?
5. Within the general context, how do variations among individual users, settings, and tasks affect the selection and utility of specific information sources and strategies?

Subject Selection

This study was originally designed to include subjects representing a non-random, selected sample of approximately 25 employees from varied corporations, who have positions involving the planning, development, and/or management of training programs. Specifically, an effort was made to select subjects who have input into decisions on whether and how to implement new programs and delivery systems and who have sought information on interactive video for training. It was anticipated that the specific title of the individuals selected might vary from corporation to corporation, and that their role as a decision-maker and information-seeker would be more important in their selection than any specific titles. It was also predicted that training managers would be more likely to qualify as subjects than corporate training personnel who primarily conduct face-to-face instruction.

Sampling Procedures

Subjects were initially selected to represent a variety of perspectives, with regard to the following factors: (1) level of involvement with interactive video; (2) type of business concern; and (3) size of corporation. In addition to constituting a representative sample, the subjects also appear to represent a significant proportion of the actual corporate training projects that are using interactive videodisc.

Level of involvement with/adoption of interactive video. Emphasis was placed on corporations that have adopted or are close to making a

decision to adopt interactive video as a training delivery system. Within this general area, individuals range from having sought information and decided to implement interactive video at some future date, to being in the process of developing a pilot project, to having fully adopted interactive video and having programs already produced and a commitment to produce more. Although it may be of interest to gather data on individuals who have made a decision not to adopt interactive video or who are only at the awareness level, the study purpose of investigating the information-seeking activities related to the decision to adopt and the adoption process suggests that the subjects should be beyond the awareness stage, in order to tie the recall of information-seeking sources and strategies employed to a specific instance as much as possible.

Type of business concern. Subjects were selected to represent diversity in regard to the type of corporations where they are employed. Corporation type was included as a sampling concern because of the possible influence of mission-related information networks on the information-seeking process. For example, corporate training personnel may have direct contact with others in similar fields or may avoid such contacts because of problems of business competition and security.

Corporation size. Size was included as a sample selection criterion because of its possible influence on information seeking. Although the nature of interactive video projects in terms of costs and production requirements made it more likely that companies involved in the study would be relatively large, individuals who are implementing

such projects in smaller companies may have different approaches and resources available for information seeking. It was predicted that more subjects would be involved with interactive videotape rather than videodisc, because of the costs involved and their familiarity with videotape, and because of the fact that interactive videodiscs are particularly appropriate for applications requiring multiple copies of programs in which the subject matter changes infrequently.

Initial subject identification. Potential subjects or corporations likely to employ such subjects in their training departments were identified through a review of current publications, leads from vendors such as Digital Equipment Corporation, Pioneer Video, 3M, and SONY, as well as publishers and consultants, the membership directories of the Central New York and Orange County Chapters of the American Society for Training and Development, personal contacts in the interactive video field, and telephone calls to corporations considered likely to have implemented or be planning to implement interactive video training programs.

The types of corporations likely to be involved were predicted from the Butterfield Communications Group study (1983), which indicated an industry-by-industry pattern in videodisc adoption for training. An attempt was made to select subjects representing the following categories of potential videodisc use for training: product service, product marketing, equipment operations, employee procedures, and generic.

Initial screening. An initial call was used to determine if the corporation was involved with interactive video (although some of this information was already known through other means), the degree of their involvement, and whether an appropriate employee (ideally within the training department) would be willing and available to participate in the study. If they were not using interactive video or were not able to participate, they were thanked and asked to recommend names of other individuals that might meet the sample criteria or of corporations that are using interactive video for training applications.

Three conferences were also used to provide additional understanding of the status of interactive video in training and the information-seeking process; to talk to vendors, producers, and consultants; hear presentations on interactive video; and to identify and contact potential subjects. These conferences were (1) The Meckler Publications Optical Disk/Videodisc Conference in Washington, D.C., December 4-7, 1984; (2) Training '84, in New York City, December 10-14, 1984; and (3) The Annual Conference of the Association for Educational Communications and Technology in Anaheim, California, in January 1985. Each of these conferences had an associated trade show where videodisc systems and programs were displayed. The Meckler Conference was specifically devoted to developments and applications related to interative videodisc.

Although those who have not made a decision to adopt interactive video were not specifically sought as subjects, additional data were gathered through the course of first-level screening to identify

potential subjects or corporations that have participated in information-seeking but have not made an adoption decision or have decided definitely not to adopt interactive video as a training delivery system.

Contacts were made first in the Syracuse and Central New York area, to facilitate the chances of obtaining in-person interviews. Additional interviews were conducted in the San Francisco and Los Angeles areas, and with individuals in other geographic locations as necessary as specific implementation sites were identified.

Interview arrangements. Subjects were selected to meet the criteria of being employed in corporate training, involved in making decisions and seeking information concerning interactive video, and from companies representing a range of services and products. When an individual was identified as an appropriate subject through initial calls, an appointment was arranged, when possible, for an in-person or telephone interview. Potential subjects were informed that their replies would be confidential, in that neither their name nor the name of their company would be included in any reporting, and that, in return for their participation, they would be sent a summary of the study results.

Information Sources Available

In order to gather information on available information sources, in addition to those sources mentioned by information seekers, current publications were reviewed and information providers contacted to

determine the information services and sources they offer. Conference attendance was also helpful in this regard.

Data Gathering

Because the study was designed to provide an in-depth examination of information seeking in a specific context, a guided interview approach including both specific and open-ended questioning procedures was employed as the primary data collection technique. While such a method allowed the collection of data on specific contextual factors related to the information seeker, the corporation, the training department, the type of interactive video involvement, and the decision-making process, it also allowed enough flexibility and depth in data gathering to insure that the study addressed the anticipated complexity of the information-seeking process.

Instrument. The interview guide used as the primary data collection instrument includes the following sections: (1) a cover page to gather identification information; (2) an introductory section to establish rapport, explain the study purpose, and address any questions or concerns of the subject; (3) a section on context for the information seeking, including factors related to the user, the department, the company, and the purpose for seeking information; (4) a section on specific issues and decisions related to the adoption/implementation of interactive video; and (5) a final section designed to address the sources and strategies used for finding information in specific instances. The interview questionnaire was designed to serve as a guide

to the general sequence of questioning and the points to cover, but the actual wording and sequence was adapted to make the interview as conversational as possible.

The interview guide was modified from other such instruments used in information-seeking studies. It was developed through a review of the relevant literature which provided a conceptual framework for the study and suggested appropriate approaches to the interview. The questionnaire used in a study on the information needs of citizens in Syracuse and Elmira, New York (Gee, 1974), was particularly helpful as a model. A copy of the interview guide is included in Appendix I.

Pilot Study

Two pilot interviews were used to determine potential problems with the interview guide. These interviews were conducted during the week of November 26-30, 1984, in Syracuse. Both interviews were conducted with trainers who had administrative responsibilities within training departments, one for a bank and the other for a utility company. Both companies were developing interactive videotape programs, and both subjects had engaged in some investigation of the feasibility of becoming involved with interactive videodisc.

The interviews were conducted following the interview guide as closely as possible, requiring approximately one hour each to complete. Results indicated that the questions in the guide were generally effective in eliciting appropriate responses, although room should be left for open responses. In many cases, the responses to one question

also applied to later questions, but the general sequence of questioning was effective. During the pilot interviews, it was difficult to record their answers completely enough by hand, and several potentially useful quotes were lost. Both respondents were cooperative and helpful and offered such a volume of information that tape-recording of the subsequent interviews was indicated. The responses reflected findings of previous information-seeking studies and indicated (1) a strong interest in the use of new technologies to increase the effectiveness of training and therefore the productivity of their company's employees, and (2) concerns over the costs and development time of some of these new technologies.

No changes were made in the interview guide following the pilot interviews, except to allow more space for answers to open-ended questions.

Preliminary analysis of the data gathered through the pilot interviews indicated that the concepts and issues addressed in the interviews were appropriate and could be coded according to the data analysis coding categories based on the interview guide (See Figure 1).

Data Analysis

Both an audiocassette recorder and hand-written notes were used to record interview data. Tapes were then transcribed, and the transcription data were classified through coding and categorization by topics and issues addressed specifically in the interview questions, including characteristics of the subject and setting, the interactive

video project, the decision-making process, and information sources and strategies used, preferred, and recommended. Additional issues or themes arising during the data collection process were also used in data coding and analysis. "Hands-on" experience as an information source, problems of hardware compatibility, and the role of "power and prestige" in acquiring information were also included.

The coded transcripts were used in several ways. First, individual index cards were prepared for all of the subjects listing the key factors related to them, their setting, tasks, and purposes, and their actual, preferred, and recommended information sources and strategies. In addition, to look at each category in more detail and be able to select appropriate quotations, coded transcripts were cut apart and segments were placed in file folders according to their coding category and number. Both of these methods were suggested from procedures described by Bogdan and Bikler (1982) as being appropriate for the analysis of qualitative data. This coding and sifting allowed the examination of the different factors of concern in this study. Coding categories were developed to reflect the general content and sequence of the interview guide (See Figure 1). They proved to be a useful scheme during the initial analysis phase.

I. Characteristics of the Setting
   A. Company: Type, size
   B. Training Department: size, structure
II. Characteristics of the Subject
   A. Position/title
   B. Job Role
   C. Background
   D. Professional memembership/involvement
   E. Experience with interactive video/video/computers
III. Interactive Video Involvement
   A. Degree of Adoption
   B. Type of system (tape, disc, or both)
   C. Type of application--e.g. technical training
   D. In-house/contracted out
   E. Involvement with CBT/linear video
   F. Reasons for adoption/consideration
IV. Decision Making
   A. Direction (e.g. top-down)
   B. Procedure: degree of formality
   C. Concerns about interactive video: costs, production, design
V. Information Seeking
   A. Awareness: source/date/
   B. People: colleagues (in company), vendors, consultants, project directors (in same business/outside)
   C. Literature: format (magazines, brochures), orientation (training, video, technical)
   D. Places: conferences, site visits, seminars/workshops (internal/attended)
   E. "Hands-on": actual project experience, authoring systems
VI. Preferred Information Sources/Strategies
VII. Recommended Information Sources/Strategies

Figure 1. Coding Categories

CHAPTER IV.

RESULTS AND DISCUSSION

Introduction

This study was designed to investigate the information-seeking process and the information sources employed by corporate training developers when making decisions regarding the adoption and implementation of a new technology for training, specifically interactive videodisc or videotape. In order to understand this process, the total context in which the information seeking occurs must be considered, including the characteristics of the information seekers and their setting; the purposes for which information is sought; and the type of information required. The utility of specific information sources or strategies can only be evaluated in relation to that context and those purposes.

Because one goal of the study is to provide guidance to potential seekers and providers of information on interactive video for training, it was important to develop a practical framework for effectively presenting the results. These results are best understood in light of two important findings about the information seekers and the context in which they operate.

First, although the information seekers in this study represent diverse corporations and vary with regard to such factors as professional membership and educational background, they are alike in the fact that their search for information takes place in the context of

innovation and technological change. Specifically, they can be characterized as having been or currently being active in some phase of the innovation-decision process.

Using the context of innovation to help characterize the subjects is important, because interactive video is an example of the type of technological innovation that is becoming increasingly available to corporations for training delivery. Also, information plays an important role during the various phases of the innovation-decision process, and the availability and quality of that information may determine the success or failure of the innovation.

The innovation-decision process, as described in Chapter II, includes the stages of awareness/knowledge, attitude formation/persuasion, trial/decision, and confirmation (Rogers and Shoemaker, 1971). Also helpful in providing a framework for reporting is the information transfer model of Landau et al. (1982), which characterizes the role of information at each phase of the innovation-decision process and suggests that information products should be tailored to the user's information requirements at each particular phase in that process.

The second influential finding, supported later in this chapter, is that the subjects are not only representative of corporate training developers involved in the adoption of a new technology, but that the sample itself may constitute a significant proportion of the population that is adopting interactive video for corporate training. This study then affords a unique opportunity to understand the information seeking

of a significant proportion of the entire population of those involved in a specific application of a specific new technology.

The sample cannot, therefore, necessarily be considered typical of trainers in general, but can more accurately be called a sample of corporate training decision-makers who are considering or adopting the innovation of interactive video. Certain conditions appear to be present in various combinations with regard to the sample and their settings that have facilitated the adoption or serious consideration of the innovation of interactive video. These conditions include such factors as a supportive corporate climate and will be detailed later in this chapter. They provide an additional framework for characterizing the population that is adopting interactive video and therefore the information seekers involved in this instance of instructional innovation.

Interactive video is an innovation in two distinct ways. First, its use will create changes for the corporation, training department, training personnel, and learners. Second, the innovation of interactive video also represents a technological development that has only recently become available for training applications. The fact that interactive video is an innovation and a rapidly-changing new technology is reflected in the type of information sought and how it is used, which in turn affects the degree to which particular information sources and strategies are considered effective. For example, the most valued information sources cited in this study are informal, personal contacts who ideally can provide accurate information on training applications.

It was found, however, that because the total number of interactive video training programs in existence is small, such sources are not often easy to locate.

Information seeking is one important aspect of the process of innovation and technology transfer. It is required to become aware of the potential of the innovation, to make decisions on its appropriateness and justify those decisions to others, to influence the decisions of others, and to learn how the innovation will apply or can be used in specific settings. In the case of interactive video, however, training developers indicate that information is often perceived as inadequate, complex, confusing, and difficult to locate. Viewing the search for information in the context of change and innovation provides one explanation for this perception.

Chapter Organization

This chapter describes the information sources and strategies used by training developers from the perspective of innovation and technological change and is organized in four sections. The first section summarizes the general characteristics of the subjects and the settings in which they work in order to establish the basic context for the information-seeking process under examination.

The second section then clarifies characteristics of the subjects, their work settings, and their interactive video projects in terms of how those factors facilitate or inhibit the adoption of the innovation of interactive video.

In the third section, the specific purposes for which information is sought and the types of information required or desired are discussed and related to the various phases of the innovation-decision process where possible.

Finally, after the context and the role of information in that context are established, the remainder of the chapter focuses on where and how the information seekers conducted their search. The specific sources and strategies used are described in detail. The advantages and disadvantages or costs and benefits of the sources and strategies are then examined in light of the purposes and type of information required. A summary of the findings concludes the chapter. Throughout this chapter, direct quotations from the information-seekers are used to illustrate major points.

The General Context for Information Seeking

Who Are the Information Seekers?

The information seekers in this study are 20 corporate training developers, the majority of whom have administrative or management positions within a training department. Although they have varying degrees of responsibility for planning, developing, and implementing training programs, their role as administrators is important because in many cases it gives them the power to make decisions on the type of media that will be used for training and how it will be implemented. It also places them in the position of being able to establish an

information-sharing network, usually informal, within their department and, in some cases, among training developers in other corporations. Through this network, others send them information of interest, or they may send others to conferences or seminars to gather information for them.

The subjects vary in terms of many of the demographic characteristics addressed in the interview. They may also vary in terms of the phase that they have reached in the innovation-decision process. However, overall, they are similar in the type of information they seek in relation to interactive video, their purposes for seeking it, and their approaches to and evaluation of the information-seeking process in this context.

The sample was limited to 20, rather than the original 25-30 planned, for two reasons. First, the findings on the important issues related to information sources indicated a high degree of similarity among subjects. The second reason supporting the smaller sample is the important finding that the number of corporations that are actually using interactive video, particularly videodisc, even on a pilot level basis, is lower than originally anticipated. Three factors support the conclusion that the subjects may be a significant proportion of the actual population: (1) the names of the same individuals and corporations were repeatedly suggested when recommendations for potential subjects were solicited; (2) the statements of many subjects themselves that they were unaware of others who were using interactive video in corporations similar to theirs; and (3) a list in the Videodisc

Monitor (February 1985) of the known locations of industrial videodisc players, which includes few corporations that are using such players for training. To avoid overemphasizing a single corporation type, several potential subjects, primarily in the automotive industry, were not included.

The information seekers also represent diversity in terms of geographical location. The interviews were conducted in person at four corporate offices in Central New York, eight in the San Francisco Bay Area/Silicon Valley, five in the Southern California area, and by telephone to offices in Illinois, New Jersey, Georgia, and New York City.

Few problems were encountered in obtaining subject cooperation, once the initial contact and agreement were accomplished. The identification of subjects and the process of making the initial contact, however, usually required many calls and referrals by others within the corporation. One individual who initially agreed to participate later declined because of concern over confidentiality and a company policy towards information sharing in general.

Background. The information seekers have mixed educational and professional backgrounds, but variations in information sources or strategies cannot be clearly differentiated on that basis. More than half of the subjects have post-graduate degrees or certifications, and two have doctorates. The majority have degrees or coursework in one or more of the following areas: instructional design or education, communications (including English, video, art, and photography),

technical (such as electronics or engineering), and business or personnel. Those with education-related degrees have generally been with the corporation for a shorter period of time, rather than having worked their way into training through some other corporate area.

Professional involvement. Meetings, publications, or conferences of various professional organizations are commonly used as sources for information, and several trainers mentioned that they use these sources regardless of whether or not they are personally a member. The most frequently-cited organization is the American Society for Training and Development (ASTD), with eight subjects reporting membership. Three belong to the International Television Association (ITVA), and two memberships were reported for both the Association for Educational Communications and Technology (AECT) and the National Society for Performance and Instruction (NSPI). Additional memberships were reported by individual subjects for the Association for the Development of Computer-Based Instructional Systems (ADCIS), the International Interactive Communications Society (IICS), the Society for Applied Learning Technology (SALT), the High Technology Training Association, and the Society of Insurance Educators. Very few individuals, however, consider themselves active members of the organizations.

An additional discovery was that although individual subjects themselves may not belong, they often "cover" organizations' publications, conferences, or presentations through either informal or formal delegation of another employee to that group, through a general corporate group membership, or through sharing the benefits of

membership of employees in other departments. For example, some subjects themselves only receive training organization publications, but they are aware that their media production department has either individual or group memberships in video-specific organizations.

What Is the Setting for the Information Seeking?

Corporation type. The corporations where the information seekers are employed are diverse and include the following types: oil refinement and distribution, computer manufacturing and sales, banking, retail, financial services, insurance, travel services, automotive importing or distribution and service, electronic equipment manufacturing and sales, utilities, food processing and retailing, food service, aerospace, and computer software development.

The type of corporation does not appear to influence information seeking except that information sharing among corporations of the same types appears to occur less often in those that are in highly-competitive industries. Utility companies, for example, may more readily share information than companies that are not monopolies. The adoption of interactive video is widespread among automobile distributors and manufacturers, but otherwise no particular industry predominates in the corporations that were used for the study. Also, based on additional calls and inquiries to corporations that are not using interactive video, the industry-by-industry adoption predicted by the Butterfield Communications Group (1983) is not strongly supported. A variety of industries are considering interactive video, and the

consideration appears to relate as much to the presence of an "advocate," corporate size, and other factors to be addressed in this chapter as to corporation type.

Corporation size. Overall, the corporations are large, multi-site businesses and industries that include several with the Fortune 500 distinction. As described by the subjects, the companies range in size from 600 employees to 190,000, including seven in the 1,000-4,000 range, five from 10,000 to 50,000, three from 50,000 to 100,00, and two with more than 100,000. The determination of the actual size is somewhat problematic, as each corporation has different structural units or divisions which often operate independently from each other. Their size would be underestimated rather than overestimated in the case of considering a single division. Many have been heavily involved in training for some time, indicating a general corporate commitment to training, and in many instances, to mediated instruction, particularly video.

Training department size. Training department size is influential in the information-seeking process only in that departments with more personnel are more likely to be able to utilize a wider variety of information sources as an overall department. The training department size ranges from two to 700, and generally reflects the size of the corporation. Again, the department size as reported by the subjects includes divisions or regional training departments as well as those with responsibilities for corporate-wide training. For example, the smallest training department in the sample is responsible for the

training at only one manufacturing plant, and there is a separate training department at the headquarters in another state.

Types of training. The types of training offered vary, with about half of the departments covering a range of training in terms of audience and content, including programs for entry-level personnel through upper management on a variety of topics. One fourth of the departments are oriented specifically towards technical training, and the remainder focus either on consumer product training, data processing training, management training, or media development only.

Departments also vary in their handling of media production. Some work directly with a variety of media, while others have separate departments within the training divisions that focus on a specific medium, primarily either video or computer-based training. Three subjects work mostly in the video area, not just interactive video.

How Is Interactive Video Currently Being Implemented in the Settings?

Types of systems. There are a variety of projects being considered, developed, or used within the corporations. Five of the projects involve interactive videotape and 13 are applications of interactive videodisc. In two cases, subjects are considering either tape or disc. Several of the trainers using tape are interested in using discs if it becomes feasible in terms of cost and production time.

Of the videodisc programs, at least two are categorized as Level 2 in terms of interactivity, meaning that the delivery system uses a stand-alone videodisc player with no external microcomputer or

microprocessor. Of the Level 3 programs, where a videodisc player is interfaced with a computer, the majority use an IBM microcomputer. The largest distribution of videodisc players reported in a single corporation is about 1,200. Some trainers are working in-house with a single system during the pilot stage. About two thirds will use or are using a system put together from individual components and the remainder are using a "turn-key" system, where the entire system is purchased from one source.

Information Seeking in the Context of Innovation

The innovation-decision process is an important framework for understanding the information seeking in this study. Initial focus was on the information-seeking process, beyond awareness, during the phase of attitude formation/persuasion. Subjects were asked where they sought information to assist them in making decisions on whether to pilot or adopt interactive video. In the interviews, however, the information seekers also often described their overall search, from their initial awareness of interactive video to the information sources and search strategies they currently use. By compiling the responses to questions on sources and strategies used, preferred, and recommended, a general picture of the information-seeking process as it relates to the innovation-decision process can be drawn.

The innovation-decision process does not always proceed in a strictly linear fashion. Also, the strict categorization of information seekers by innovation-decision phase is complicated by the fact that adoption can be attributed to both individuals and organizations. For example, some of the subjects have conceptually adopted the medium, but are waiting for management approval or for development and production costs to decline.

Despite some overlap and the difficulties of describing what in practice is not necessarily a linear process, the basic categories of innovation-decision are still helpful in understanding the evaluation of

the information sources and strategies used by the subjects and in giving a general idea of where they were at the time of the interviews with regard to the adoption of the innovation. In this study, three subjects can be considered to be in the phase of attitude formation/persuasion or seeking information to support a presentation to management, although they have generally decided that they will eventually use interactive video. Ten are in various stages of trial/decision and are developing or implementing a pilot project, and seven can be considered as having adopted interactive video. Companies are considered as "adopters" here when either a commitment to hardware has been made, the programs will be sold in conjunction with a company project or used on a wide scale for personnel training, or additional non-pilot programs are planned.

Why Are These Information Seekers Involved in Innovation-Decision?

The specific corporate training environment studied is an example of the broader context of innovation and technological change. In order to understand these information-seekers and how they evaluate information sources and search strategies in the specific context, it is also appropriate and important to describe that more general context in some detail.

It is evident that there are some specific conditions that are likely to be present where interactive video is being considered or adopted. These conditions are factors that facilitate the adoption in some way or make it more feasible than might be the case in other

organizations or circumstances. The adoption of interactive video for corporate training delivery appears to be facilitated by the presence of one or more of the following conditions or factors:

(1) An advocate or interested individual who will look for appropriate applications, seek information on the innovation, and promote the innnovation to those who can help to influence its adoption;

(2) A supportive corporate climate in terms of structure and philosophy;

(3) Technical support for media development and implementation;

(4) An application or a training problem whose solution lends itself to the attributes of the innovation; and

(5) As the Butterfield (1983) study called it, a "window of opportunity," which may include some change in the corporate structure, the training department, the clientele, or in the technology itself that makes the use of the innovation more appropriate or feasible.

Each of these conditions is addressed separately and the way the sample reflects or varies in meeting that condition is discussed. Comments of the subjects are used to illustrate key points.

An advocate for the innovation. Strong advocates for the innovation often provide the impetus to information seeking that lays the groundwork for adoption. Although the adoption of interactive video for training is often due to the presence of a variety of complex factors and conditions, one of the most important requirements is that

at least one individual must have a strong personal interest in its adoption. The initial knowledge of the innovation must stir their imagination enough that such individuals see a potential for the innovation in their own setting, and seek additional information to be able to sell others within their organization on that potential or on a specific application.

> We got into interactive video about 2½ years ago. We had heard that it was one of the more exciting techniques that was being used, we did some investigation into it and decided that we wanted to be one of the industrial pioneers of doing that.

The information seekers are similar in that they have a definite interest in the potential of interactive video. They are not necessarily the initial instigators toward adoption within their organization. However, many who are the driving force in promoting interactive video have been interested in the attributes of the medium for many years. In fact, sometimes this interest preceded the actual availability of an interactive videotape or videodisc system.

> When I was going to the university and went to the computer fair, I stood around and looked, and I said, 'There's got to be a better way to bring these two things (computers and video) together.'
>
> I thought about it when I was getting out of school in 1972 in terms of it would be something that would happen.
>
> I had an interest that training should be more sophisticated than a blackboard.

The impetus or initial awareness can originate from outside the organization through hiring or from a colleague within the corporation.

> We had a gentleman that came to us from a university. We recruited him out of three instructional design programs, and while he was there he got exposure to interactive video, and he told us that we should jump on the bandwagon.

> I learned about it from one of the associates that I was managing. One of the gentlemen who began working for me was already doing some experimenting, and he was a very long-range, futuristic thinker, and he was the one that really introduced me to it. . . . who has been really in the forefront all the way through.

In other instances the interest of someone in upper management is enough to support the creation of a specific position to seek out information on the applications and implementation of the innovation.

> The vice president of human resources who used to be director of training (she was promoted), she had this idea in her mind, and it's really from her that it got started. And she just sees a potential for it. It's interesting too, because our company is very conservative.

Nearly one third of the subjects are specifically responsible for investigating and implementing new technology for corporate applications, primarily computer-based training and/or interactive video, and were hired either primarily for that purpose or "evolved into it" because of an interest, although they may have other duties. One trainer in this specialized role described his responsibilities as follows:

> I'm in charge of technology implementation, and that area is responsible for facilitating and the adoption of new training technologies within the company. More specifically, my role is to research or to identify and to implement new training technologies within the organization.

Another developer, one of the few who is not in an administrative position, has become the training department's resident "computer

expert" almost by default, because he originally used the computer to assist with statistical analyses for program evaluation.

These information seekers have an interest in interactive video for varying reasons. One group can be characterized as having a general interest in new technology. In this category, which includes many of those whose position directly involves staying current with the technology, several made such comments as:

> I'm a big one on toys, and the more expensive the better off I am or at least the more I like it, and so when interactive video came out, it had all the looks and feels and sounds of a nice toy, so it caught my eye.

In at least seven interviews, comments were made to the effect that one reason interactive video was under consideration was basically because it was new. Two training managers implied that the prior methods of delivery of instruction through filmstrips or film loops were perceived by those receiving training as old fashioned:

> We had pretty much decided we wanted to go with video, just because it's more state-of-the-art, and gives a better image of the company, I think, to the employee.

Beyond an interest in interactive video because of its novelty or "flashiness," most trainers appear genuinely intrigued by its specific attributes and how those attributes could help them solve training problems, including cutting costs and providing more effective training. When queried about their reasons for being interested in interactive video, the attributes of the medium were mentioned most often, including the following factors: the potential for interactivity, random access, multiple entry points, and the potential for keeping records on students

and individualization of instruction. Several respondents referred to the possibilities for student involvement and learning improvement as reasons for consideration. Interactive video is perceived as capable of providing consistent information, allowing for flexible scheduling of instruction, and bringing timely training to the learner, rather than requiring the learners to come to a centralized location, particularly in industries with a high rate of employee turnover.

Supportive corporate climate. The second condition facilitating adoption is the setting or climate, primarily the corporation itself and, within that, the training department. Important factors include a positive philosophy concerning new technology that may include the formation of specialized departments or specific policy to deal with technological developments, support of research and development, and a corporate structure that lends itself to centralized course development for decentralized training sites. These factors combine to create a climate that varies in the degree to which it inhibits or supports the adoption of innovation and specifically interactive video. Those climates that are less favorable for innovation may require the interested innovator to focus more attention on acquiring information that will persuade management that interactive video is an appropriate training delivery system. For example, it is more likely that information on cost savings will be more convincing than information on training effectiveness.

A climate supporting new technology is often reflected in the establishment of particular departments (within almost half of the

corporations represented) to coordinate information and applications related to computer-based training, interactive video, or new educational technology in general.

> Last year, in support of the growing technology in interactive video, we formed a fourth department now, and that is the technology training department.

The development of special training departments to coordinate new technologies also illustrates the fact that the trend toward use of the new technologies and general automation are creating problems for corporations in deciding where the responsibility for computer-based training or interactive video program development should reside. Because interactive video may involve computer-based instruction, video production, instructional design, and content related to the use of new electronic equipment, the departmental "ownership" of interactive video programs can become complicated and often political. One respondent specifically commented that, although her corporation wants to be involved in new technology, they are not sure where her function as an investigator of those new technologies should reside. In fact, she may be "farmed out" to another department. There is departmental competition in this corporation, as well as in others, for the responsibility for this new technology or the ownership of the application.

In another corporation, one trainer in the same department as the interview subject has been assigned to act as a liaison between the training department and the systems technology support or "anything to

do with computers." The corporation is hoping to coordinate interactive video, systems, and computer-based training applications.

> We're going through the same thing every company's going through. Who's going to train? Who's going to take care of training on computers? We're hopefully getting closer with those departments in the whole change of automation. We are highly automated on the mainframe, but we're not highly into personal computers yet.

Another factor that may influence the corporate climate for the adoption of innovations is attitudes toward research and development. One issue that may surface in developing an interactive video program is whether the project is primarily a research and development effort or whether it must result in a viable training product immediately. A concern was expressed that first efforts should be as carefully developed as possible, because the resulting programs would likely be employed as "selling" tools to either management, clients, or other divisions. One trainer describes the problem and their solution as follows:

> For four years, we were on horns of a dilemma in that do you just do a videodisc program for the sake of doing it, regardless of whether it is the best alternative delivery system, or do you just wait to find a perfect application. One way is to say, "Let's just call it research, and we won't look for any effectiveness. We just want to do it to say we've done it, and we can start learning from there." And we just said, "Well, lookit. We want to do it as research, and we want to pioneer, but why should we sacrifice? Let's see if we can find a good application and sell it."

Structure of the corporations and their training departments also appears important in creating a climate for innovation and interactive video. Many of the corporations in the study are structured around

decentralized branches, stores, dealerships, and franchises. Others have large divisions that may vary in the services or products offered. Several have also recently undergone a significant restructuring of their organizations or mergers with other corporations. Despite the decentralization of training delivery, the development of training programs is often centralized, although smaller training operations may exist "in the field."

> We have to do something to try and train the entry-level technician because the dealers don't want to invest any money in sending him to courses. We don't charge for our technical training, but (if) the dealer sends somebody to class, it costs him expenses. . . They don't want to invest in him. They want to see if he's going to be around for awhile. But that's the guy we have to get ahold of to try and give information to him as quickly as possible.

Sometimes some of the program costs can be carried by individuals with franchise agreements with the corporation who are not direct employees but are instead independent business owners.

Another common arrangement found in six instances in the study treats the training department as an independent business concern or agency that provides services to clients from other divisions within the corporation and that may charge back to that division for program development. These departments often conduct internal "marketing" of their services and may accept business from outside clients as well. One training developer who is creating a demonstration disc to generate some interest in videodisc stated:

> There is some interest in disc throughout the company, but we want the interest to come to us, because the company doesn't have to use its internal resources. So we have to generate some interest ourselves. We have to do our own internal marketing.

There was a difference of opinion over whether this factor improved the climate for the adoption of interactive video. However, emphasis on front-end analysis required to sell the program may also require a more extensive information search than might have otherwise been attempted.

Technical support. Several factors related to the technological aspects of the innovation also appear to influence innovation and information seeking in these corporations. For example, a favorable climate allows the use of equipment that is compatible with interactive video. The determination of compatibility with existing or favored systems is a common focus for seeking information. Although the corporations do represent the primary industries where it was predicted that interactive video would first become widely used, including banks and electronics-related firms, it was surprising to find how limited such applications are, even in computer-related industries. One explanation is the restriction imposed on many training departments that they use either the equipment manufactured by the corporation or the equipment provided by a dealer with whom the corporation may have an exclusive purchase agreement.

> We are going pretty heavily with what we can do with X computer, because that seems the most feasible now, given that we have a commitment that those are the kind of computers being used.

Of the computer manufacturing and software development companies contacted, none indicated that they were using interactive video on a

widespread basis for internal training purposes, at least at the time of this study.

A good example of the problems encountered is offered by one trainer who had initial difficulties in obtaining a computer for the training department. He had to "disguise" the computer in the budget as just a piece of equipment that was one component of a training department program (rather than an innovation).

> See, our problem then was just trying to get a computer in here, because we knew we were going to have to go through a lot of approval systems.
>
> Because it's a computer, and because computer people are afraid when other people mess around with computers, they've made it mandatory that you run everything from business card size calculators to IBM 360's to them for approval.

The use of other media in the corporation may also be a factor in facilitating adoption as there may be less initial capital outlay and more chance for getting one component than a whole system.

With notable exceptions, the information-seekers are generally more knowledgeable about video-based training than computer-based training, or at least they were before they began their interactive video projects. The corporations that were already using linear video for training prior to consideration of interactive video are more numerous in the sample than those who have already implemented computer-based training (CBT). All but four corporations were using linear video in some way prior to involvement with interactive video. Although eight indicated that there is some use of CBT programs, overall the applications of CBT are still very limited and many involve the use of

mainframe computers rather than the microcomputers most used with interactive video.

Occasionally the adoption of interactive video represents the first foray into either the computer or the video areas. For two corporations, the selection of interactive video is the result of investigation into a variety of options for video presentations.

One of the technical factors that appears to support the feasibility of adopting interactive video is the use of as much in-house production (video and/or computer programming) as possible. The majority of the departments in the study rely on some in-house production, using the corporate facilities and production personnel. However, because interactive video production is a complex process, at least six of the disc projects and two of the tape projects involved the use of outside consultants for design or production of either the software, the video, or both.

> It's interesting that we're even in this interactive, because it is such a new project, so we have to stay conservative in a way in using it. We will have to start doing more in-house production, in order to financially proceed with this program. We won't be able to always go out. It's a luxury right now. But my feeling was that in order to do it right, since it is a pilot to convince others, tha- you have to use outside video people, because there's just no other way. . . As we learn a little more there will be certain things that we can do in-house.

In some cases, program developers have already moved from reliance on a consultant to in-house production. Also, consultants generally appear to be used as part of a total development team, and no trainers

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In some cases, program developers have already moved from reliance on a consultant to in-house production. Also, consultants generally appear to be used as part of a total development team, and no trainers

reported being completely removed from the development process once the decision is made.

> The prototype module was one where we gave it to the vendor to build for us, but we lived with them. Even though they did it in Boston, it was not without a lot of dialog, I'll tell you. One of our staff just worked herself to death, but she beat them up until they were black and blue all over, and the product that came out reflected it. What they did, they did with a lot of her guidance.

Appropriate applications. Even if corporate training developers have the interest and some organizational and technical support, it is unlikely that they will promote interactive video without considering its applications within the corporation.

Some subjects report looking for a "good candidate" with which to begin using the medium, i.e., a training problem that lends itself to interactive video training. One example is the use of interactive video to allow for flexible scheduling of training programs:

> We had a unique problem in our corporation, although it's not unique among other corporations, in that our computer personnel were working off shifts most of the time and could not come into the training centers for classes. They often did not have extended periods of time when they were available for instruction.

Situations requiring the actual certification of learners or assurance that they have completely mastered the skill are viewed as particularly appropriate. Some programs teach how to use a particular piece of computer software program or computer-based equipment, so interactive video is considered a "good fit of the technology to the task," as one information seeker described it.

Cost savings are also included as an appropriate justification for an application:

> I think it enhances some courses greatly. There are probably two reasons. You could look at it from a cost savings standpoint and from a training improvement standpoint. From cost savings, you could save money if you can avoid buying expensive equipment, actual equipment used for training purposes. The other way is that students obviously can learn more from what they see. You can learn more by seeing than you can by just reading. Students don't learn all that much by just reading text.

Particular aspects of the corporation that support applications include large, decentralized training populations, the need for flexible scheduling of training programs, and specific skills to be taught that lend themselves to computer-based training or a visual approach.

A "window of opportunity." Other conditions that have facilitated adoption of videodiscs in specific settings include shifts or reorganization of training departments, a general increase in automation requiring additional training, adoption of the medium by a competitor, and new employee procedures that require additional training.

> I recognized the problems that we had with people commuting, the students or the trainees commuting or the trainers commuting and the fact that there was starting to become more and more significant differences in the abilities of the people attending classes.

Recent developments in the technology itself have also affected the viability of interactive video, particularly reductions in costs and time required for production and mastering of videodiscs.

Some of the characteristics of the sample have been summarized to suggest factors that support or, in some cases, inhibit the adoption of

interactive video. It has been suggested that this adoption is facilitated by the interest of a specific individual, a favorable corporate and technical climate, a viable application, and a new opportunity. All innovations in this context may not result from these factors. However, if as it is proposed, these subjects are a significant percent of a specific group of innovators, most innovation-decision situations regarding interactive video for corporate training will probably include one or more of these conditions to varying degrees and in varying combinations.

The Role of Information and Information Requirements

What Information is Important and How Is It Used?

The information seekers in this setting indicated that they were looking for specific types of information at different times. These purposes and the content of the information being sought can be related to the role of information in the context of the innovation-decision process.

Based on the four-phase model of Landau et al. (1982) that identifies the varying roles of information in relation to innovation-decision, it is evident that the information purposes and content required in relation to interactive video can generally be categorized by phase in the process. Again, there is some overlap because these phases do not always occur in a strictly linear fashion.

During the first phase of awareness/knowledge, information is used primarily to gain a general understanding or overview of the innovation and to learn where to find additional information.

The second phase of attitude formation/persuasion requires general information to learn how the innovation would apply to the user's setting.

In the third phase, trial/decision, specific information on the applicability of the innovation to the user's situation is used to make a decision on whether and how to try the innovation.

The final phase requires evaluation information to decide whether to continue or reject the innovation.

In the case of interactive video and new technology, the information that is important can also be categorized as to the type of information required and the purposes for its use. Based on an analysis of the responses of the training developers regarding their concerns when considering and implementing interactive video, a general description emerges of the information that is important as the innovation/decision process progresses. This description is also drawn from statements on the effectiveness of the information sources used, preferred, and recommended. Emphasis is on the middle phases because of the focus of the interviews.

Phase I: Awareness/knowledge. In the awareness phase, the information required often covers the (1) range of capabilities of interactive video such as random access, still/motion, dual audio tracks, and record-keeping functions; (2) the components, including videotape and videodisc players, interfaces, video monitors, authoring systems, and computers; (3) applications, such as simulation or drill and practice; and (4) costs: the monetary range for hardware development, production time, and disc pressing.

Phase II: Attitude formation/persuasion. During the attitude formation/persuasion phase, if a general interest has been stimulated, most information seekers then want to know more about how interactive video could be applied to training. Such information is often used to persuade others and to decide whether to proceed with a pilot or a project. The specific information required often relates to (1) capabilities: relevance to the training setting; (2) costs and cost

effectiveness: in comparison to existing programs; (3) applications: who is using interactive video for training and how are they using it; (4) components: what is compatible with existing systems and policy and what would need to be purchased; (5) impact on environment and learners; and (6) potential problems: what have other trainers encountered?

In specifically describing the content of the information they desired, costs were mentioned by almost all the information seekers. They usually were referring to the costs of hardware as well as development. Several stated that they felt it was important not just to look at the development costs, but at the costs over the total life-cycle of the project. Compatibility of hardware with other equipment, particulary what they had available in their corporation, was the second most common concern; it was expressed by six subjects. Effectiveness or cost-effectiveness was mentioned by four subjects, as were design issues related to planning, branching, or graphics. Development time, hardware, maintenance, feasibility, production, staffing, authoring programs (which one or ease of use), security, and hardware reliability were also listed as concerns. The topic, its life expectancy, and its fit to the technology were also identified.

> I think that the hardware reliability was probably at that point the number one consideration with us, just because we'd lost some credibility with some of our operators because of the lack of reliability of the previous sytem.

> It's the obvious ones. It's the cost. And cost is in two categories for us. It's expense dollars versus capital dollars. Capital dollars means if you have to buy equipment, like computers, that's capital dollars and it comes out of a totally different budget. If it's the expense dollars, expenses would be like travelling, like buying software, hiring a consultant to do some work for you, those are all expense dollars.

> Well the biggest single thing that people always throw at you is the cost of the hardware...Well I think the real big difference, the real thing to consider, and this is very hard to get across, is effectiveness...Of course I have to convince the people. They're not going to want to hear some of this effect stuff. They don't even want to talk about it.
>
> My criteria are initial cost, what my customer base is going to be, and the maintenance of it.

Several respondents focused on the students and how they would react to using such a system, as well as how many students would be involved in using the interactive video program.

Phase III: Trial/decision. If the innovation is deemed generally applicable and/or approval is granted for a pilot or program production, then the information required becomes even more specific and personal. Information in the trial/decision phase is used to make a decision on exactly what to do in the setting: (1) systems: what to buy; (2) the specific application and learners involved; (3) consultants: whether or how to use one, and which one; and (4) how to design, produce, implement, and manage the program. For example, with regard to learners, one training developer commented:

> And the one thing we have to do with a pilot is figure out whether or not people will respond to it. We know that our craftspeople like the computer. We don't know if our operators, machine operators like the computer yet....We've already experienced some clerks resisting or at least voicing some concern whether or not it would be good training. I mean, if I learn from a machine, is that anywhere near as good as learning from a human being? So those are some things to take a look at.

Another stated:

> We picked technical training as our area, and we're going to test this whole thing and see how it works out. We've been doing investigation about how it would work and what we could do. We've

> spent about a year and a half investigating it. I'm glad to see us actully produce something now and see if it works.
>
> I think right now that I'm past the stage of reading and going to conferences. The one I'm at now is that I want to do it. I've heard these people talk about it. I've seen what they can do. I need to experience it now. After I've experienced it, I'll probably be ready to accept more input from other sources.

An issue of particular importance in this phase is how much production will be done in-house and how much will be contracted to other firms. A goal expressed by the majority of those information seekers using consultants was that they would like to be able to learn enough from the consultants to be able eventually to handle their own production. One trainer commented:

> There are probably some things that we would never get into, just beyond our time abilities and staffing abilities, and so on, but we don't know what those are, and so we want to work with them, and in the process learn what we can reasonably expect to do ourselves and what we should have outsiders do.
>
> I spent quite a bit of time with my client (in the corporation) in evaluating the vendor's project development services to see if we should do in-house or outside (production).

Phase IV: Confirmation. Information seeking in the final stage usually centers on very specific feedback related to the implementation of a pilot such as its actual costs, effectiveness, and how it is perceived by management and by learners.

General procedures for decision-making regarding innovations. Information is used as a basis for decision making at various phases of the innovation process. In the interviews, training developers were specifically asked about the process of decision making in their

training department and corporation with regard to the adoption of a new technology such as interactive video. Therefore, this section emphasizes the processes related to attitude formation/persuasion and trial decision. One purpose was to determine if the impetus for the decision on interactive video was primarily internal within the training department or was the result of external decisions by upper management. The degree to which the innovation must be "sold" depends on a mix of the conditions described previously and the processes that exist or are used for making decisions on the adoption of a technology.

With regard to the adoption of a new technology such as interactive video, slightly more than half of the respondents indicated that in their settings there is no particularly formal procedure. In all cases, the actual recommendation for a specific application and/or system comes from within the training department, although they may have been told to investigate video or computer-based training.

> It was my decision to go with tape (as opposed to disc). When I was hired, I was just told we wanted interactive video. Figure out what we should get and do it. So it was up to me, basically, to find out what's the best.

> There was no real formal procedure. No, it was really more of a group decision that happened. I mean eventually, obviously with that kind of investment we had to make a formal proposal to the board of directors but at that point it had pretty much been decided which way we were going.

Those with the formal procedure include most of those who were hired specifically to look into new technologies. In some cases, the decision to go with interactive video resulted from corporate clients

coming to them. In one case, a subject reported that although a formal procedure existed, it was rarely used.

Although no formal procedure may exist within the department, if the adoption of interactive video involves purchase of a computer or other expensive equipment, it usually is part of a general cost-justification procedure or is considered a capital budget item. Therefore, information on costs is a high priority during the innnovation-decision process.

Problems relating to the coordination of automation in general are also evident in this process. For example, one respondent noted that one of the problems in her corporation has been that each department was dealing separately with different computer vendors. In several corporations, individuals in one area or division are aware that others in the corporation may be involved in interactive video or computer-based instruction, but there is apparently often little coordination of these applications, other than in those corporations where someone has been specifically given that role. One trainer described his efforts to coordinate such efforts:

> I've been trying to all along, to get people involved. I tried to get our systems department involved, figuring they would be the logical ones, and they know nothing about interactive video currently, but they have consented to work with us on the pilot program and learn. And I've tried to get other departments involved and they're all busy doing their own thing. But I just keep telling them, 'This is what's happening'. I've been trying to inform them what's going on. And they all want to jump on the bandwagon, if we ever can get it through.

There is some evidence that the adoption of new technology and the concerns over not just interactive video, but personal computers and

general automation, and linear video in some cases, may in fact be causing an increase in the formality of procedures for media selection, program development, and decisions on what program to buy. This is because of the costs, development time, and staff dedication required, and because capital outlay for equipment may require more extensive cost effectiveness justification.

Overall, the respondents in the sample appear to be quite similar in their concerns about interactive video; they are currently in similar phases of innovation/decision. They differ in their prior involvement with video, computers, and interactive video, but they are influential in making decisions about the adoption and implementation of interactive video.

The Information-Seeking Process

Overview

The previous section characterized the subjects and settings in the context of innovation and technological change. The subjects in this study are generally similar in terms of what information sources they use, the ways they access those sources, and the sequence in which they use them. The sources and strategies employed appear to follow a general progression that can be directly related to the purposes of information in the innovation-decision process.

This section describes the various sources used, the reasons they were selected, how they were accessed, their utility, and their perceived advantages and disadvantages. These disadvantages and advantages or costs and benefits relate to the purposes for which subjects sought information and the type of information they were seeking. Therefore, few sources are perceived as inherently positive or negative. It is more often true that they are considered adequate or inadequate for certain purposes. Overall, however, sources of information about interactive video are often ineffective for finding the information trainers would like, due to the nature of the innovation, and the current status of its development, and the lack of the specific type of information that meets the requirements for individuals in the later phases of the innovation-decision process.

The following presentation of the findings on information seeking generally reflect the phases in the innovation/decision process. First,

how subjects learned or first became aware of interactive video is summarized. Then, the specific information sources and strategies used in making decisions about the adoption and implementation of interactive video are discussed in detail. As determined in developing and field testing the interview guide, sources can be generally categorized as people, publications, or places. However, an additional information source that was identified during data analysis is that of experience. The inclusion of experience as an information source lends support to the importance of the innovation-decision model as a framework for studying information seeking. Such experience is particularly desired by subjects who have passed the attitude formation/persuasion phase and want specific information on how the innovation actually works in their setting. Information seekers talked of reaching a phase where they had to experience interactive video to know what else they should learn.

How Do Information Seekers First Become Aware of Interactive Video?

When asked about their initial knowledge or awareness of interactive video, very few subjects were able to recall specific details clearly. In most cases it was at least four years prior to the interview.

> I would say it was when we first started looking at putting simple video equipment into some of our stores. Because we knew that there might be something a little better than just being able to throw a tape into a machine and pushing "Play." We have openly discussed it in our company for the last four years.

One of the trainers most recently involved with interactive video commented:

> It was just through discussions with this production person that we'd been dealing with, and in the course of working together he showed me a lot of things that he had been working on independently. And around the same time, I started reading about it too, in some of the trade journals and things like that.
>
> I had never heard of it before I started working here. . . I originally heard about it from my boss and from another co-worker who is into the technical aspects of the videotaping, and I asked them where they heard it from. My boss said from professional meetings and my co-worker said more from the literature.

Some have "dabbled" in other interactive technologies, including interactive tape.

> About 1972. I was part of a team that developed and designed an interactive remote controller for videotape players.
>
> I've been involved in the video business for a long time, and I'm just kind of following as things go. It just seems like a natural for what we're trying to do.

It has taken some time for trainers and companies to move from awareness to adoption. Despite the fact that the use of interactive video for training is considered a relatively new phenomenon, most companies have been looking into it and/or video for about four years, although some looked even earlier. The earliest date that was mentioned for a serious investigation into the feasibility of interactive video for a specific application was 1975, with the majority of the "early adopters" indicating an interest since 1979. The most recent awareness reported was nine months before the interview; the longest (in terms of

the possibilities, even before appropriate systems were available) was 13 years. Initial sources identified include a mix of video consultants or program vendors, reading, colleagues or fellow employees (particularly those in the video field), university coursework or contacts, and ASTD presentations. Two subjects remembered receiving a call from Discovision (a company which marketed an early interactive laser videodisc player) or seeing an early demonstration of that system as their first awareness.

> It seems to me that I got a call (in 1979) from somebody saying, 'We want to show you a demo of a product called Discovision." This was over in San Francisco, on Montgomery Street. That's the first recollection that I have. Now I'm not saying that was the first but (that's the first that) I can remember.

People Sources: To Whom Do Information Seekers Talk and Listen?

Direct personal contacts are the primary information source used and preferred. The major categories of people used as information sources are vendors, colleagues (internal and external to the corporation), and consultants and other interactive video "experts." Each of these categories is discussed in turn and illustrated with direct comments from the subjects. These categories correlate with the general sequence in which information is sought and also the innovation-decision process, in that vendors are often a primary source during initial phases and consultants are often used when a specific project is underway.

Vendors. This category includes representatives of companies that manufacture and/or sell videotape and videodisc equipment and

computer/video interfaces; videodisc mastering companies; and software vendors and developers, including those who develop generic software programs and authoring systems. The vendors category includes individuals that are primarily oriented towards development or sales of hardware or software, rather than services, although many of the manufacturers also offer consulting services. Subjects, however, tended to see consultants as being a different category when referring to individuals who were not connected with a specific hardware company. Manufacturers of videodisc players were often mentioned in this category. Some consultants do offer authoring systems, also.

Vendors were the source most often cited first when information seekers were asked where they went for information for decision making. They are also the most controversial in terms of their advantages and disadvantages. They were most often contacted through trade shows or conferences, professional organizations, direct calls from the subjects to them or vice versa, visits and demonstrations within the corporation, and site visits to their firms. For example, in several cases, once the field of possible vendors had been narrowed to a reasonable number (3-10), site visits were made to see demonstrations and discuss specific issues.

The subjects who did not use vendors as a direct primary information source are not as far along in their adoption of interactive video or have relied on independent consultants to gather the information for them from a variety of vendors.

One major advantage of dealing with vendors is that they can provide specific information about costs and capabilities of specific hardware, systems, and products.

> Manufacturers are the main source of information. . . I think if you want a real honest answer on who's doing what and who knows what they're doing, you go to the people who make the discs, and the machines. You go to Pioneer, you go to Sony, and you go to 3M. And people I know who are coming and looking for people who will really help them, who are knowledgeable, ask the manufacturers. That means to get a straight answer, you've gotta have power and prestige, because manufacturers are spread pretty thin. But they still are the most knowledgeable, they have the most at stake, and they'll do the best job for you.

The other major reason that subjects cited for their dealing with vendors is that they are a primary "conduit" to another highly-valued information source--other companies that are using interactive video and other individuals who have direct experience in developing, producing, and implementing interactive video programs.

The major disadvantage reported by information seekers is that vendors are usually promoting sales of a particular product and are perhaps therefore inherently biased.

> The information (from the vendors) was helpful, but you have to kind of screen it a little bit, so most of them are pushing either a software package or they're pushing hardware. In the stage we're at, we want to know more about how it works, what you can do with it, what I can do. And of course every authoring system is perfect and you can do everything with every authoring system, which is not the case.

> I did speak to some other people. I spoke to some representatives initially at (a videodisc player manufacturing company) in their industrial video division about it, and really found that based on what I'd read and learned already, that I knew about as much about it as they did. I think partially just because it was so new. They hadn't really gotten involved in it.

In response to whether or not they were helpful:

> No, not really. They didn't even know their own equipment a lot of times. We definitely knew more about (their videodisc player), what they were marketing as their industrial player, than the salespeople knew. That's giving them the benefit of the doubt that they were being honest with us.

The other major criticism of vendors that emerged is that they are perceived as being very limited in their knowledge of how interactive video can be specifically applied as an instructional medium. They are considered as lacking in an understanding of trainer's specific requirements, which interferes with their ability to discuss fully and comprehensively the applications of their products in corporate training settings.

> How I found out the most information about interactive video and how I found out that vendors confuse it, is through ASTD national conferences. Especially, I think, during the 1980 or possibly the 1979 conference, interactive video was really starting to hit the bricks hard. And the entire exposition hall, a good portion of it was interactive video. And I'll tell you that the way they sold it was, "This is going to solve everybody's problems," and all I saw was no one had anywhere near perfected an approach to respond to the needs of trainers. They just had a product and were trying to sell it, and weren't asking any trainers what they were trying to do. So it became very confusing.

A related criticism of vendors as information sources is that their demonstrations (when available) are generally perceived as poor in their ability to convey the power of the medium and its potential for training delivery. In some instances, subjects reported having had salespersons try to sell the product without any demonstrations. Demonstrations are important to understand the capabilities of the medium initially. Especially popular are demonstrations in applications related to those

in which the information-seeker is considering the use of interactive video. Demonstrations are often a useful tool to "sell" managers on the concept, too. At least two trainers complained that the demonstrations that they had seen were on such topics as flight simulation, and that while they could make the conceptual leap to training applications, it was extremely difficult for managers to do so.

> I don't think that vendors really know very much about the hardware that they sell, especially specific applications of hardware. They generally are very good when it comes to providing information about the actual product that they're selling. What they aren't very good at is being able to talk in any depth about the applications of the hardware. And that's not terribly unusual with high tech in general. As a general rule, most computer companies, and most companies that develop interactive vidodisc hardware are generally a pretty poor source of information as far as applications of those technologies within training are concerned. So I would rate them as a poor source as far as application goes. I would rate them as a good source with respect to the product itself.

Several subjects commented on personal experiences with vendors who promised products or services that were currently unavailable, or salespeople who failed to tell them important details or misinformed them about the product (either its capabilities or lack of a desired capability). Some vendors also indicated that they could provide services directly, when in actuality those services were being sub-contracted to other producers/designers.

Overall, then, vendors are considered as a useful source for knowledge of specific products, but one that should be dealt with the same caution that should be employed when purchasing any expensive item.

> See, the equipment's the easy thing. Everybody focuses on the equipment. It's not that it's easy. You've still got the same bag of worms. But the hard thing is making an effective program that's interesting and stimulating, doesn't lose interest, and works, and gets the point across. That's very difficult, and very few people, especially manufacturers understand that.
>
> Maybe they shouldn't understand that, by the way. I mean maybe that's not part of their job. If it were me, that's what I would be out organizing and doing, if I were them, promoting. I would find an application because that way you're selling benefits and things like that. You're not selling hardware. And as long as you're selling hardware, and who really cares if it's a 3.2 or 3.1 (frame access time on a videodisc) or whatever until you realize what the differences mean for you in terms of capacity or speed or something. So they understand a lot about features, and they understand a lot about different things, but they kind of expect the users to be the expert. It's an emerging technology, and as you well know, it's very difficult at this time.

The use of vendors as a primary information source is congruent with the concern over costs and equipment expressed by a majority of subjects.

One factor that appears to influence the degree to which vendors are viewed as being good sources of information is the relative "power and prestige" of either the company or the information seeker. Several subjects indicated or agreed strongly with the suggestion that it would be difficult for individuals who had no affiliation with a large company (one with a potentially-large sale factor) and also without a "name" in the business to get accurate information or to be provided with much individual attention.

In responding to a question about this issue, one trainer in a very large corporation responded:

> Oh yeah. (If computer companies) and some of those have a potential customer, you know "money speaks." For just an individual who is just wanting to learn a little bit about it, I would think it would be very, very hard for them. You take, say, (a large company who sells an authoring system). If you walked in

> and said, "I'm Mr. X, and I have no money behind me, I'm going to buy a little system, and I want you to tell me about interactive video," you would get their attention until someone came along with a business card and waved some potential money under their noses. I would find it very, very hard as an individual, I would think, to learn about it.

Another trainer, who had earlier commented favorably on the information received from hardware manufacturers, qualified his earlier statement by saying:

> Yeah, but then again I'm X Company. And I'm also pretty well known individually, so take one of those out whether it be my name, reputation, or the company, and I've had enough problems. It hasn't been a piece of cake for me. I've been very much concerned at different points. So I can imagine someone from an unknown company, and an unknown person it would be even more so. Because I have personal relationships going back a number of years with these people. And just their focus has been either on the military or on the major car manufacturers.

In this case, the subject also later commented that even his reputation in the business as being knowledgeable and his association with a powerful company did not prevent problems of dishonesty:

> Well, I've been hoodwinked by several people that I thought were very honest, knew what they were talking about, well-connected. I'm not going to brag about it, but I mean, God, if I'm getting hoodwinked, what about Joe Blow?

The perception of vendors as useful information sources appears also to be related to the degree to which trainers are looking for answers to specific questions and are able to articulate a specific training problem. This is much more feasible for information-seekers who have already determined a potential application for the medium or may be deciding on specific equipment for a pilot. As one trainer put it, "I know what I'm looking for, so if they don't agree with us, that's

up to them. It's really pretty much a matter of we pretty much know what we want from the student standpoint." When one is just learning about interactive video, detailed discussions of particular hardware or software products and configurations can be overwhelming.

> I found vendors more confusing than helpful because they got into a lot of technical things about the interactive video. And of course you can use it with this machine and that machine, and it has this capability and that capability. I didn't need to know that, because I didn't even know what it did yet. I needed to know more about what it would do in the classroom.

Colleagues. Next to hardware vendors and consultants, the major information source in this category is other personal contacts, either within or outside of the corporation. Over half of the subjects indicated that they had used colleagues as information sources. Several noted, however, that at the time they were initially seeking information, they found that there were no other corporations in their particular field (such as insurance) that were already using interactive video for training.

Within corporations, these personal contacts are generally employees of the subject or colleagues in a different but related department. Occasionally staff have been hired because of their knowledge or background in interactive video or that background had an influence on the subject becoming involved in an interactive video project. In one case the subject's boss was mentioned as a primary source.

In many cases, the individual in the training department has an information-sharing relationship with an individual in the video services department or in a computer area if there is one, although the video connection appears more common.

Outside the corporation, colleagues are generally contacted through professional organizations and conferences, other conferences and seminars, and direct calls. Vendors sometimes refer individuals to others doing interactive video projects in the training field, but consultants appear to do so less often, perhaps because of proprietary agreements with their clients. At least three subjects traveled to visit other corporations that were using interactive video for training.

The primary organizations that provided direct contacts are ASTD, the IICS, SALT, ITVA, and ADCIS. With the exception of ASTD, these organizations are the most specifically oriented to interactive video of those listed in professional membership or involvement.

A criticism voiced about ASTD is that it is too big to be very helpful for locating individuals specifically involved in interactive video.

The primary advantage of using personal contacts within the organization is that they are accessible, know the applications being considered or used and the concerns of the training developer, and can tailor the information they share to the subject's specific information requirements.

Within-corporation contacts can be used to expand the benefits of conference attendance and membership in professional organizations, in

that many subjects send others in their department to conferences or seminars, even though they themselves are often unable to go because of time constraints.

Problems of communication among corporate divisions and departmental groups were indicated by several respondents. This tendency is supported by the difficulty encountered during the study in locating subjects in some corporations where interactive video was reportedly in use. In several cases, other divisions were unaware of who was using interactive video in their organization or even whether it was being used. Several statements in the interviews indicate that trainers do not always know what else is being done in the company.

Personal contacts in training settings outside the corporations can provide first-hand information on their actual experiences in using interactive video, including any problems, pitfalls, and successes.

> Getting information from someone else who has been involved, who can summarize everything that they have done quickly, and who can answer questions is by far the most valuable way of getting information. And it may be that you have to do that with one or two or several people, too. But that kind of resource is the most valuable.
>
> In terms of interactive, if you get to someone who's tried it, you can find out a lot of the mistakes that they made, before you go make them yourself. It might help.

The primary problem with these sources is that there are very few corporations using interactive video, they are scattered all over the United States, and they may be hard to locate.

Another potential problem in using individuals in related settings is that in some cases corporations that are using interactive video or

considering its use are in competition with each other or have a general policy that limits information sharing and interaction with other corporate personnel. Two subjects specifically mentioned that they did not talk to other trainers for these reasons.

The description by one trainer of the personal contacts she made to seek information summarizes the "interactive" nature of the search process and the way that sources are combined and accessed in different ways:

> I guess one of the first persons I went to was X Company out in Sacramento. So I started with her, mainly because my vice president had seen the program and said, "Go talk to X," so I did. And from her I went to see a video production house, and a software design company, and then I went over to the authoring system place, and then I went to the Video Expo and the Data Training conference. They had a conference out here right at the same time with some things on interactive video. And I guess that's where I learned about the IICS. So I went to all of those meetings and just bugged people a lot, talked to a lot of people, and of course talked to the people at X College.

Consultants. This category includes companies or individuals that primarily provide services such as hardware and software integration, program development and production, and guidance on selection of hardware and software. Most are employed in the private sector, although several have university ties. The military was also included as a source of information.

More than half of the subjects included consultants as a major information source in the "people" category. In about one third of the projects, a consultant played a large role in the actual development of the programs, particularly the initial efforts.

Consultants are primarily located through trade shows and conference attendance, reading, and the recommendations of hardware manufacturers and other interactive video users. In at least two cases, the consultants had been involved in linear video production with the company or one of its employees. As in the case of vendors, once a potential group of consultants was identified, site visits were made in several cases to see demonstrations and discuss the services offered by the consultants.

One issue that should be noted in interpreting the findings is that consultants in some cases are also vendors, particularly of authoring systems or "turn-key" hardware configurations. The distinction, therefore, is not necessarily clearcut.

Consultants are generally considered to be a good information source, although several opposing opinions were expressed.

> It's not that they (books, consultants, production houses, authoring languages) aren't effective, it's that they aren't totally effective or there's a lot of people out there who aren't very good and they pass themselves off as being good and then you get into trouble. I mean if you called (a well-known consultant) and asked him how you design a program, or to design a program for you, by the time you were done with the program you would know how to do an interactive video. So I would say that the consultant route isn't a bad route, if you went to the right kind of company.

Stated benefits of using a consultant are that they provide information on a wider variety of systems than hardware vendors, and in the cases where they are not tied to a particular product, they are perceived as being generally less biased by comparison. They have often developed an extensive network of contacts and a particular expertise in

one area that would be difficult for an individual training developer to duplicate, particularly under their typical time constraints.

Another major positive quality of consultants is that they may provide training for the trainer on interactive video development and production.

> So we were developing possibly X modules, and they developed the first three as teaching modules for us. We worked in concert with them, and they gradually handed off to us some more of it. We learned the more we did, and so that the last ones we did really on our own, with them consulting and working with us.

> We've hired outside consultants to do the video at this point because it's so new. The consultant works with the video people and is directing the program. Then he works with me separately in helping me to learn the programming language and to learn how to use the authoring language to the fullest.

Another described his use of a consultant:

> We're going to be contracting with a company, and one of our criteria for this pilot study was we wanted a company that could produce our program for us but also involve us as much as possible. So we're not going to be producing it. They're going to produce it, but we are going to be actively involved in the producing of the course, and that's so we can learn as much as possible about this, the whole process.

One subject was pleased that the consultant could be used on a flexible, limited basis that does not require him to use a formal cost justification procedure. He is interested in a gradual implementation that "doesn't make waves."

Consultants were also named by this trainer and others as a source for receiving published information.

Consultants can be a more expensive method than searching for information on one's own. However, consultants from universities may

offer their services for lower prices or even free. Also, graduate students in some cases are used on a consulting basis.

Subjects with more extensive video experience were less likely to speak highly of consultants.

A difference of opinion was evident over whether an academic background was a good quality for a consultant.

> The reason that we selected the company that we did was the fact that they more than anyone else were putting their emphasis upon the educational aspect in terms of utilizing the technology as an educational tool, whereas we felt a lot of these other firms were really getting more enamored with simply the technology and not really putting the emphasis upon the educational. And so it was really the people at X, who included a university professor. They just had an extremely strong background in education. And then they surrounded themselves with the support people who were educators themselves and then they got into the computer design area. And it just made a beautiful marriage. And so we've stayed current with the technology end of it, but I still feel that we are still far ahead in terms of being able to use the technology as an educational tool, not as an entertainment tool, and I think there's a vast difference out there.

> I would never hire anybody that was a faculty person, personally. I would hire someone with a Ph.D., but I wouldn't hire them if they were faculty, for something like this, 'cause they're just not going to understand. It's my own personal bias. . . People who are on full-time faculty somewhere just have a very hard time, first of all, relating to training and what that's about as compared to education, 'cause they really are two separate things, even though they both involve learning. And also, how the business world operates. People that come out of a strictly government or military or educational university background really have a hard time relating to a corporate need. If they've been out of it for awhile, fine, but anything less than two or three years, I think they're going to have some failures, and I would just as soon not be their guinea pig.

Criticisms of consultants included that they may over-emphasize or sell production, and that they may not be completely honest about total

costs of projects, the services they can offer, and the degree to which services are subcontracted to others.

Published Sources: What Do Information Seekers Read?

Although reading was included by several subjects as a source for initial awareness and as a part of a general strategy that included talking to vendors and interactive video users, in no case was it identified as the most important information source. Several subjects stated that nothing they had read had been particularly helpful.

Reading materials used are primarily articles in professional training journals or trade magazines related to video or computers.

In the training area, the most often cited sources are articles in Training magazine and the Data Training newsletter, which were both noted by four subjects. Very few subjects could recall specific articles, but four indicated that they have file cabinet drawers or other personal files where they collect such information. This question was not asked directly, so it is possible that more have a file collection of articles on interactive video.

Of the remaining publications cited, Instructional Innovator, Videodisc Monitor, and Video Computing were named by two subjects as were publications of the ASTD. Beyond that, the following publications were specifically referenced by at least one subject: Northeast Training, Machine Mediated Learning, Video Manager, the Instructional Technology Newsletter, Journal of Computer Based Instruction, Training and Development, Personal Computing, Video User, The Nebraska Videodisc

Design/Production Newsletter, Audiovisual Directions, Audiovisual, Video Systems, and Videography. In several instances, trainers were unclear of the exact titles, so those publications are not included here if they could not be verified.

In general, publications can be characterized as being professional journals related to training, trade magazines specific to video or computing, and a few periodicals that focus on interactive video. One developer commented that he also read general publications such as Fortune or Business Week.

Books were included by five subjects as information sources.

Publications are accessed primarily through in-house subscriptions and personal subscriptions, through colleagues and consultants internal and external to the corporation who send the subject copies of articles, and occasionally through conferences. If individuals do not read the article themselves, they are often aware that someone in their department or in a neighboring department such as audiovisual services receives particular publications.

In many cases, individuals reported being considered the departmental or company "expert," or that they have indicated an interest in the topic to such a degree to other people, that they receive what one subject called "periodic information dumps" from other people sending them articles and brochures. In some cases providing a supply of information is a specific task requested of their subordinates. Others have friends in other locations who send them material periodically. In some corporations where membership in

professional organizations is divided, assignment to a particular association may include a responsibility for regular review of the organization's publications and referral of any relevant articles to the potentially-interested colleagues in their department.

Brochures sent by vendors or consultants are another source cited by several subjects. They often request such information, but because of their positions, they generally receive a generous supply of direct mailings from a wide variety of individuals with systems or services to sell.

Both periodicals and books are perceived in general as being less helpful than direct contacts. One subject commented, "Reading an article is interesting, but it's probably not the most effective way to get the information." The benefits of publications appear to be in providing overviews of the capabilities of interactive video that are useful to those new to the area or for explaining the concept to managers.

They also provide awareness of "who's doing what" and what hardware is available. In the case of the Videodisc Monitor and Video Computing, for example, contact names, addresses, and telephone numbers are often provided at the end of articles.

> The problem is that there's not really good material out there on applications or design, or anything that commands you. Videodisc Monitor tells you what the latest technology is and tells you applications people are working on, but it's not very much in depth.

Seven subjects included reading as a source, but only two of those said it was preferred. One trainer in particular likes good research

papers and good critical articles on how interactive video works and studies on cost effectiveness or implementation strategies, but that she has not been able to find those types of articles.

> I've gotten information from several sources which have sort of married to give me what I need in terms of making sense and having an idea about what I want to do. I've done information gathering with users. I've talked to two other companies at least who are using the same interactive system. I learn a lot from vendors, but I really prefer, I guess because I'm old fashioned, I like to scan text . . I like good research papers. I like research papers which sometimes are rare in education that tell you what the subject matter was that the design was about. What I miss is good, critical articles on how this works. So many are fascinated with the novelty of the medium and not what it could do for them, that I haven't really seen anything out there that makes a lot of sense to me.

The other subject who prefers reading commented:

> Well, in general I'm a reader, but I think as far as interactive video, the reading has confused me more than hearing about it directly from people. I think what I would prefer is to experience it.

Books that offer step-by-step assistance on program development and implementation and that address conceptual design issues were suggested as potentially valuable but currently lacking. Several respondents revealed that they had been considering writing their own books. (In two cases, subjects have written books on the topic, but one of those trainers even stated that he feels that his book is too much of a survey, although it may have been useful originally).

> None of the books have been particularly outstanding. I don't think mine was either. I'm really thinking of writing one on design and conceptual thinking and planning, because I haven't seen anything that's been particularly innovative.

In terms of providing practical information, reading in general is seen as inadequate and often frustrating. The academic approach of some articles is also a complaint. A common criticism is that articles are too general, or paradoxically, in the case of many video/computing articles, occasionally too technical. The perception of articles as being too technical may be due to the stage of adoption of interactive video or because a value is placed on finding information quickly, and it is a slow process to gather the required information on hardware, video, computing, authoring systems, interfaces, design, evaluation, and applications, from separate published sources.

The following comments of one trainer summarize the perceptions of much of the literature:

> There were quite a few articles that were coming out at that time. Training magazine featured an article on interactive videodisc, and it highlighted some of the various sytems and their characteristics, strengths, weaknesses, pricing and so forth. There was also a series of articles in Journal of Computer-Based Instruction. Anyway, we were frustrated by most of the writing being done and the articles that were being published at that time were really university and academically-related. We got a lot of information about how it had been used in the academic environment and public sector, but we had very little to go on in terms of corporate use.
>
> I think their value was in disseminating information about a media at a level that a manager could understand. They could get the basic idea of what this technology was, it could be used as a sales tool, and we could go from there. But in terms of actually helping us get started, it was not at all helpful. And that's a continuing problem. Most of the articles that we see are really very generic in nature, and they have these wonderful titles, but you get into them, and it's a rehash of the same topics all over again--how to justify it, how to plan for it, etc., but nothing really about the guts of what goes on when you do interactive video.

Existing articles and books are limited and are perceived as being primarily too general or being only surveys, rather than providing information on "how-to." In other words, publications appear to be perceived as unsatisfactory information sources, except for general awareness, following trends, and providing overviews. In terms of actually providing substantive, relevant information to guide decisions, publications are generally inadequate.

> I haven't seen a lot of good papers this year. I don't think the people who are doing these things are documenting it that much. I can substantiate that, because I talked to two publishers, I called two publishers, and they were both interested in a book. But there is very little literature, hands-on stuff, that a person can go out and buy off the shelf that tells them how to do this. It just isn't getting back to us.

Places: What Do Information Seekers Attend?

All but three subjects have attended at least one conference, trade show, workshop, or seminar where interactive video was discussed or interactive systems were displayed. Eight included ASTD local or national meetings as a source of information. Four listed the SALT conference, and two indicated that they had sent others to a SALT conference. Three in California mentioned attending a Video Expo show, five had attended conferences sponsored by Training magazine. Other conferences listed including the Data Training conference, ADCIS, AECT, and five attended seminars or workshops presented by independent consultants or vendors.

Conferences are valued primarily for providing a way of making direct contacts with vendors, consultants, and other trainers, and interactive video users. They are also valued as a means of seeing demonstrations of actual products.

The actual content of presentations was, in fact, characterized less often as important for providing information than for the networking or demonstration aspect. Presentations can provide an overview of "what interactive video is" and in some cases "what it can do."

Conferences in general are an "interactive" information source that provide opportunities to make direct contacts, ask questions, see demonstrations, and occasionally have "hands-on" experience with equipment or programs.

Criticisms of conferences include the fact that they can be overwhelming, may be too large, that presentations do not allow for the differences in sophistication of the participants, and that short presentations of anywhere from one hour to several days are still inadequate for providing much of the "nitty-gritty" information desired by trainers.

> But you know, my real feeling is that you can't learn a lot in a one day seminar. And you can't learn anything in a half hour or one-hour or two-hour talk, except get general exposure to it. So you're still going to have to sit down and learn. So the real answer to the question is, or the real question ought to be, not where do people go, but where do they go and try to get information and they don't get it.

Lack of time, lack of corporate support both philosophically and financially for conference attendance can limit their usefulness. Seven subjects specifically commented that they are limited to attendance at no more than one conference per year. Working in or near a major metropolitan area such as San Francisco allows trainers to attend workshops or conferences that might not be feasible in other geographic areas, as many are restricted in the number of "distance" conferences they are allowed to attend.

Workshops are useful, although in two cases they were criticized as being limited by their lack of adequate examples of interactive video, a failure to discuss design issues specific to interactive video, and a lack of time for hands-on experience with interactive video programs. Their primary advantage is seen in their function as a place to meet other trainers involved in interactive video. The following comments are typical of the perceptions of workshops and seminars.

> I didn't think it was a very good seminar. I felt that there was a lot more time being spent on issues of instructional design that were not at all specific to videodisc and most of us in the room were very familiar with the instructional design process, and we were all there to really learn what are the specific differences and considerations in instructional design as related to videodisc and that didn't come up until the last half day. There were also a lot of videodiscs there. Very few were demonstrated. I don't think we got into hardware in terms of selection criteria as much as we could have. It was more, this is what's available, and it was go look in a catalog and see what fits. That's my impression. I don't know whether other people shared that, but I felt it lacked substance.

> It seems like I came out of conferences or seminars more frustrated than not. I think the problem is that they're just so general that they aren't telling me much that I don't already know. The kinds of things that I need to know, they don't have the answers to, or they don't have something that's specific to the people I have to

> train. They just don't seem to get down to the nitty-gritty enough.
>
> I was a little disappointed in that workshop because we didn't even get to see very much of interactive video. They sort of divided us into groups as to how to prepare for it. Well that was not different than preparing for any kind of training thing. So I was real disappointed. I didn't learn enough. I would like to be able to actually do it, and that I guess I'll learn just from doing the CAI stuff. I had to figure it out by the manual, trial and error.

Experience As an Information Source: What Do They Do?

After the initial stages of knowledge/awareness and the decision to try or pilot, subjects may reach a plateau or a stage where they feel they need to experience interactive video "first-hand" in order to learn. The closer one can come to experience with a project the better. That is one reason why demonstrations are perceived as useful. Although perhaps not traditionally seen as an information source, in this case, such experiences as using an authoring system to develop instruction, using video alone, computer-based instruction alone, class projects, interactive videotape production, and limited experiences at workshops were included as sources.

Authoring systems, which are designed to enable individuals without formal training in computer programming to design programs, was identifed as a source that trainers probably <u>believe</u> is a primary information source. One experienced videodisc designer stated, in continuing his discussion of where people <u>do not</u> get good information:

> The number one place is systems like authoring languages, which they think will teach them how to do it. And to some degree I guess it will. So I guess that would probably be the number one line or place where people try to get (information), and so then authoring languages become a big deal. Even though you don't have

> to have authoring languages to design interactive video programs, well people think that's the easiest way to do it. And it probably isn't.
>
> That's what people don't know about interactive video other than what they've picked up in the one hour seminars, which is sort of what it will do and that it is a wonderful thing that if you want to be ahead of everybody else you ought to learn this, and besides it's fun and exciting. It's showbiz. So then, people get into that and they say, "But, God, where do I start?" Well, go out and get an authoring language. So they'll call some companies, get an authoring language . . .and so there's that effort, and the idea I really think is that it's not so much that they expect the authoring language to teach them to make authoring easier, it's that they expect the authoring system to teach them how to design interactive video.

Another training manager commented that he was limited in his knowledge of computers, having had no systems background:

> I have to be a hands-on learner. To sit through things and just have people tell me things doesn't work. I have to get in and learn and work with the keyboard and the whole thing.

One of the reasons that hands-on experience is so valued, is that these training developers tend to be in the forefront in terms of use of the technology. As one subject commented:

> The best source for me is to experiment with it myself. Now, if we were way behind other people, which we're not, then I would say if I could talk to other people or read articles that would help. But I know that what we're trying to do is something that nobody else is doing.

Summary

Information seeking related to interactive video for corporate training is a complex and often confusing process. Information to assist in decision-making is particularly limited. The most common and most preferred sources of information for corporate training developers in this context are people who can provide practical and reliable information about specific systems and the applications of interactive video in the training setting.

Sources used and the evaluation of the effectiveness of those sources appears to be related to both the stage in the development of the technology of interactive video itself and the purposes and content for information-seeking which tends to shift during the innovation-decision process from a need for general information on overall capabilities to assistance in evaluating the innovation in a specific setting and specific application.

The results provide little basis for directly correlating specific characteristics of the subjects, settings, or tasks with particular criteria for evaluating information seeking. Instead, the findings indicate that corporate training developers may vary in educational and professional background and other factors, but that they are similar in terms of the criteria by which they evaluate information sources during the adoption of an innovation. They employ and prefer similar types of information sources and strategies and have generally similar opinions about the utility of those sources and strategies in regard to specific

purposes and types of information. The process of seeking information on interactive video is occurring during a time of rapid change in the technology itself. The adoption of a new technology is slow in the corporate setting, and depends on the presence and interaction of a variety of conditions.

Chapter V discusses general conclusions and implications of the study and offer recommendations to potential information seekers and information providers.

CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

This study has examined the information-seeking process as it relates to technological innovation and change in the context of corporate training. Specifically, it has focused on the information sources and search strategies used by training managers and developers when considering and implementing interactive video projects.

The findings show a general similarity in the purpose for information seeking, the sources and strategies used, and the evaluation of the utility of those sources and strategies in this context. Variations are present along such dimensions as educational background, interactive video project scope, and the formality of the organizational decision-making process.

Viewing the findings from the overall context of instructional innovation and technological change has provided a useful framework for understanding the information-seeking process. How information sources and search strategies are evaluated appears to be clearly connected to the extent to which they provide information that meets the requirements of those involved in the developmental process of the adoption of a technological innovation.

This chapter offers conclusions that summarize how the information-seeking process is taking place within the specific context of corporate training and the broader context of innovation and change.

These conclusions incorporate several of the "cross-cutting" themes which emerged during various stages of the study. Each conclusion is discussed in terms of its relation to the relevant literature, possible limitations, and implications for further research and the transfer of information in this context.

The generalizability of the study is also discussed. The remainder of this chapter then presents practical implications in the form of recommendations for information seekers and information providers. Emphasis is on advice for others who will be involved in seeking or providing information on new technologies for corporate training, specifically interactive video.

Conclusions

(1) The adoption of interactive video is proceeding slowly but surely and depends on a combination of factors which are sometimes unpredictable.

Information seeking on interactive video is occurring in the context of technological innovation. The adoption rate of that innovation also affects the flow of information about the innovation. Despite a current strong interest in interactive video, the medium is not being widely used in corporate training at the present time. Corporate trainers who have adopted interactive video can justly be considered innovators and pioneers in the application of this new technology.

The number of corporations that have actually adopted interactive video appears to be even more limited than might be indicated by an initial survey of the literature or through discussions with the hardware companies. A surprising number of calls to corporations which, it would be anticipated, be involved with interactive video met with such comments as, "We looked into that but decided it was too expensive now," or "We're not even into computer-assisted instruction. This company has been very conservative about becoming involved with new technologies."

There are several reasons for slow adoption. As indicated in Chapter IV, the adoption of this innovation requires the presence of one or more conditions including an individual advocate, a supportive corporate and technical climate, an appropriate application, and a particular opportunity that may provide additional justification for the innovation.

One barrier to the adoption of interactive video is interdepartmental conflict over the ownership of the technology, i.e. does it belong in the realm of the computer services department, training department, or the video services department. Additional barriers include high costs for equipment and development, equipment compatibility difficulties, and competition between research and development and product-oriented missions of training departments.

The characteristics of innovations that affect their adoption rate and level have been listed by Rogers and Shoemaker (1971) and include relative advantage, compatibility, complexity, triability, and

observability. Interactive video is perceived as having advantages over Computer Based Training (CBT) alone and especially over linear video, but the cost may be prohibitive enough to override that perception. Also, the specific advantages are difficult to prove because the development of this technology is still in an early stage.

Compatibility difficulties include the perception of interactive video as a medium for individualized instruction, whereas in current training programs group presentations are common. Compatibility of hardware with existing systems is also an issue that affects the rate of adoption.

Complexity appears to be a major factor inhibiting the adoption, because use of interactive video combines the difficulties of CBT and video, either of which by itself may represent an innovation to many corporations. Level 2 videodisc programs that require only a videodisc player with an internal microprocessor may be easier to sell, for example, than Level 3 programs that require a more complex configuration of hardware. Complexity of design, particularly multiple branching, is also a potentially discouraging characteristic of interactive video for those who are to develop programs.

Trialibility is a crucial issue limiting adoption. Many trainers are interested in seeing and experiencing interactive video, but they may find few existing programs that have been designed to parallel their specific training applications. It is also expensive to purchase an interactive video system just to try it out. Some trainers are experimenting with interactivity in related media, such as filmstrips or

slides. In fact, an unanticipated finding is that the chararacteristic attributes of interactive video have intrigued some trainers to such a degree that interactive video is changing the way that they use traditional media. Others perceive interactive videotape as a preliminary step to videodisc.

The observability of interactive video is another factor limiting its adoption, in that it may have to be demonstrated or experienced to truly understand its attributes and potential applications.

Information seeking is an integral part of the innovation-decision and adoption processes. The availability of the information required to make decisions for adoption and implementation is influenced by the development stage of the technology itself, and the type of information needed is related to the innovation-decision phase of the information seeker. In the case of interactive video, a lack of appropriate information or information that is inadequate to meet the needs of training decision-makers, is also one of the reasons why its adoption for training has been slow.

How quickly the adoption of interactive video will proceed is difficult to predict. The findings support the predictions of the Butterfield Communications Group (1981) in that corporations represented do include large companies with large training tasks and some companies that are technologically-oriented in terms of the products they manufacture or distribute. The results also support the prediction of growth of the use of interactive videodiscs for training in corporations where there is a "window of opportunity" such as the following: the

desire for embedded training and training support for computer-based products or equipment; rapid expansion in a corporation; a desire to replace aging or old-fashioned equipment that coincides with a promotion of the innovation; changes in the characteristics of the training populations; increased decentralization of training; and the proliferation of personal computers, which are suited to interactive training methods. However, personal computers may represent a training problem in themselves to some companies.

A special interest on the part of even a single individual is perhaps one of the most important factors. The influence of the advocate or "futuristic thinker" makes accurate predictions on where innovation will occur difficult. In the early stages of the diffusion of an innovation, adoptions may occur in a non-systematic fashion and can be influenced by accidental encounters with someone who has knowledge of the innovation at a time when there is an "interest and sensitivity" to the innovation.

A prime example of the way this diffusion can occur is evident in the case of one company's switch to videodisc even after an initial study had recommended videotape (without a recent investigation of videodisc). Additional information that swayed the decision toward videodisc was gathered through a fortuitous encounter in a parking lot where the manager happened to notice the personalized license plates of a representative of a videodisc player manufacturing company. The plates reflected the representative's involvement with discs. The resulting conversation about recent developments in disc technology

prompted the manager to request more information, which was delivered to his office the following day. That information was enough to re-open the company's decision process. This company's investment in videodisc resulting from that chance encounter was $4,000,000.

This example points up that, although an information seeker can conduct a systematic search to learn about an innovation, in the case of a new technology (and other innovations), accidental encounters with information providers may also be influential in the decision to adopt an innovation, or at least in disseminating information about the innovation.

(2) Information on interactive video is difficult to find, and available information sources are often inadequate to meet the information requirements of corporate training developers.

Wilson's (1983) contention that trainers are confused about the nature and training potential of interactive video and have insufficient information to make informed purchasing decisions is supported by the results reported here, particularly during the initial phases of the innovation-decision process and in the initial stages of the development of this new technology.

Information is used in this context to provide general knowledge, support decisions on adoption, and evaluate appropriate applications and actual development efforts. With regard to interactive video, trainers require a general understanding of the capabilities and specific knowledge of the applications of the medium. They also need to see

examples of interactive video in applications or settings related to their own.

The available information is confusing for several reasons. One reason is that interactive video is a complex, new technological innovation that in itself may be difficult to understand. The combined problems of having to learn about hardware, software, design, video, computers, and interfaces require that information may have to be gathered from a variety of sources. Indeed, a common strategy in information seeking is to use multiple sources and to talk to experts or read widely in many diverse fields, including video and computers. If a variety of sources are not used directly, then an information-gathering "system" (in the form of an outside consultant) is often hired.

Information from other trainers who have tried the medium is highly valued, but finding such individuals can be difficult in view of the limited number of interactive video training programs in existence. Sometimes issues of competition or policies prohibiting information sharing limit access to such individuals.

The problems of finding information on a new technology are particularly severe for business and industrial applications. Rhodes (1985) suggests that the philosophy of sharing as little information as possible is common in the field of educational technology because of the close ties the discipline has with business and commercial interests, as opposed to scientific or professional areas. He comments:

> Thus a newcomer to computer assisted interactive video will not find it easy to gather needed information on the 'nuts and bolts' of designing, producing, and implementing CAIV. This kind of information is not readily shared by business and industrial firms

> who have spent large sums on developmental efforts. Their reticence is understandable, but it simply illustrates the problems that computer assisted interactive video faces as an educational technology. That is, while the intent may be educational, with norms of public sharing of ideas, the process is much more commercial, with norms of maintaining proprietary interests.
>
> The AECT and associated meetings reflect that problem--on the one hand we have 'academic' paper sessions, like scholarly associations, but on the other hand, there seems to be a hesitancy to reveal what might turn out to be too much about what is going on. Anyone contemplating work with computer assisted interactive video in an educational setting needs to realize that this dichotomy exists. (p. 2)

Because it is an innovation and few systems are in place, an emphasis on hardware places vendors in a strong position to be information providers, but that information may be colored by the profit motive. A concern was expressed in several interviews that, because of the rapid changes in the "interactive business" and the potential to profit by others' ignorance, a certain unsavory element or group of opportunists may be attracted to the field. These individuals may place profit over effectiveness or production quality. Such practices may eventually backfire, however, as poor programs have been criticized for diminishing the chances for successful adoption of the innovation. Others whose motives may be legitimate may still be making poor decisions about the applications of the new medium.

Because of the limited quality of observability, demonstrations are important to the diffusion of the innovation, but few appropriate demonstrations are available or easily accessed.

Worcester's statement (1983) that there are no experts in videodisc is supported by the findings, and trainers may have a difficult time knowing whom to trust. The current study also strongly supports the

perception by Hoekema (1983) that "the only way to learn how to produce an interactive videodisc is to produce one" (p. 6). In this case, when trainers reach the adoption stage, experience may truly be the best teacher.

(3) People are the primary and preferred source, and networking is the primary strategy.

Direct personal contacts are the primary information source; ideally, they are people who can show, demonstrate, answer questions, and teach. The most prized information comes from others who can describe their experiences with interactive video in a training setting.

Conferences, organizations, universities, workshops, and even journal articles are seen primarily as a way to find out with whom one should be talking. The term "networking" provides a very accurate description of the activities of most of the respondents. In some cases, however, training developers have been able to obtain approval for a project relatively quickly and have been forced to move rapidly through the innovation/decision phases. In these situations, such respondents reported spending less time searching for information on their own. Instead, they often relied heavily on consultants for information gathering.

Some of the generalizations of Faibisoff and Ely (1976) are supported by the fact that trainers can be seen as seeking easily accessible information and emphasizing face-to-face communication. Also supported are their findings that information needs change at stages

in projects; that trainers tend to follow habitual patterns and are often dissatisified with assistance they receive; and that the quantity and quality of information can have an inverse relationship (pp. 9-11).

The findings seem to contradict those of the Educational Market Information Study (1977), which indicated that educators ranked objectivity low when judging an information source. In that study, however, emphasis was not on seeking information related to decision making on purchases or expensive products. The results fit those of Summers et al. (1983) in that the qualities of being free or inexpensive and providing access without involving others were ranked low. The qualities of being authoritative, accurate, reliable and objective, and likely to have the desired information ranked high.

Trainers have different information-seeking habits than educational technologists in academic settings, if compared to those in the study by Ely (1981). Academic technologists preferred personal files and libraries for varied tasks, particularly journals and specialized newsletters. The study supports Ely's contention that different types of educational technologists have different information needs, even though trainers have different information-seeking behavior than academics and are less print-oriented in particular.

(4) Information requirements and perceptions about sources and strategies change with the growth of the technology and the phase in the innovation-decision process.

This conclusion has been addressed throughout the study in using the innovation-decision framework. However, some additional conclusions can be offered at this point.

As trainers become increasingly familiar with CBT, video, and interactive video, and as the technology itself develops, information requirements will probably shift. As an innovation becomes more commonplace several factors can affect the information-seeking process and the utility of sources. Once systems are in place, less time will be required to decide what to buy. Vendors as information providers may become less important to those who now are early innovators. Vendors and salespeople will develop more effective demonstrations and have more varied applications to demonstrate. More site visits will be possible as the innovation becomes increasingly dispersed geographically. Some trainers will be less dependenent on consultants as they learn to evalute their own requirements and create their own programs. Off-the-shelf programs will become more available, eliminating the need for custom production in some instances. More experienced users will be available to answer questions. Publications will be tailored to specific applications with fewer articles presenting overviews of general applications.

Hands-on experience will also become more available as equipment costs decline and decisions are implemented for purchasing systems. As

this shift in information requirements occurs, there will be a corresponding shift toward finding information related to design and management issues and away from the current concerns of hardware incompatibility and costs.

Generalizability of the Results

Confidence can be expressed that the findings accurately reflect the information-seeking process employed by corporate training developers in the target context. The findings can be generalized to training developers with management functions in primarily large corporations who are becoming interested and involved in the development and implementation of interactive video training programs. Not only can the findings be generalized to the context of interactive video, however, they can also be applied to seekers of information on other technological innovations that will become increasingly available in business and industrial training, particularly those that require the purchase of new equipment, changes in program production techniques, the expertise of a variety of disciplines, and the custom design of programs. Still, several cautions should be offered in interpreting the findings and in generalizing them to a larger population.

First, the sample may be somewhat unique in that they are "early adopters." As innovators, they may be different as a group than typical corporate training developers. As a group, they appear to be highly involved in their work, knowledgeable and articulate, and aware of current issues in training and development. They generally share an interest in new technologies, communications, and adult learning. Most have college degrees, and those with less formal education have extensive experience in various corporate positions. They place a high

importance on front-end analysis and knowledge of instructional objectives and learner characteristics.

Time factors, too, may affect the study generalizations. Even since the study began, more publications and articles on interactive video have appeared. As an example, the January 1985 issues of Videography, EITV, and Audiovisual Communications have had major articles or cover stories devoted to various aspects of interactive video. Also, Pioneer Video Corporation has introduced a newsletter and an instructional seminar on interactive video. The information-seeking process of the subjects in general often occurred over approximately a four year period, and in some cases may have started more than 10 years before the interviews. Therefore, specific instances and sources were hard to identify, and subjects tended to generalize and categorize the sources of information, sometimes "lumping together" sources that might otherwise be different in some way.

Opinions on the quality of information sources must be viewed in light of these considerations. Hardware salespeople cannot necessarily be faulted for an inability to discuss applications when few projects have been implemented. Their companies may have had little money available for the development of demonstration discs for training, when most research and development money is funneled into the equipment development itself. For some companies, trying to be in both the hardware and software business has not been an effective approach.

Because of high costs, hardware manufacturers and vendors may be short staffed, but they still have had to provide information to

individuals who might not necessarily be even close to making a purchasing decision. In other industries where product changes are occurring less rapidly, users have more basic familiarity with the item being sold. Another problem is that there were very few clearcut distinctions made between vendors and manufacturers. Comments based on the bad experience of one person with individual salespeople should not be considered a blanket indictment of an entire company. It is also not difficult to understand why companies attempt to put their energies where there is the most likelihood of a return on their investment.

The size of the sample must be considered in interpreting the findings, particularly in formulating clearcut generalizations about levels of adoption. On the other hand, even though the sample is small, it still represents a sizeable proportion of the population of interactive video innovators and allows the results to be justifiably considered a case study of information seeking in a very specific instance of an instructional innovation.

A final but important consideration in generalizing the results to other groups is the fact that information seekers and information providers are not always distinct categories. Information seeking is itself an interactive process, and the roles shift at times during this process. The information seeking has a reverse side--the information dissemination process--to which it is linked in the total process of information transfer. This study has focused on the information seeker and has viewed innovation from that perspective, but the findings have practical implications for both seekers and providers.

Those implications are presented in the form of recommendations summarized from the specific comments and suggestions of the sample and from a synthesis of the findings and conclusions.

Recommendations

Suggestions and implications for information seekers

During the interviews, training developers were specifically asked what they would recommend to others who were considering becoming involved in interactive video, in terms of finding relevant information. The advice from the sample to other information-seekers is relatively consistent, and almost identical comments were made by several respondents. In this section, those recommendations have been merged with general suggestions resulting from analysis of the overall findings to form the following set of general recommendations.

(1) Use a variety of information sources, but look for people who have project experience.

The most consistent recommendation was to find others who have worked with interactive video and talk with them about their experiences. The reasons for this recommendation are that these individuals can talk about the benefits and problems of specific systems, can provide quick answers, and can offer "secrets" about design and development.

A single information source is inadequate to deal with the complexities of interactive video. One trainer stated directly that beyond talking to those who have worked with interactive video, "There is no good source." Others, however, advised talking to varied groups, including vendors and experts in the areas of computers, video,

interactive video hardware, and design. Joining an organization such as the ITVA, SALT, ADCIS, ASTD, or the IICS was highly recommended as a way to meet others involved in interactive video, to find out about possible courses, and to learn who is involved with interactive video. Seeking out special interest groups focused on interactive video is particularly stressed. Other sources recommended by several individuals include universities involved in interactive video, consultants (who can act as an "information-gathering system"), and conferences (primarily to meet others and to visit trade shows).

> I'd tell them, number one, to start with the IICS. They're local people and they know a lot of people. I would tell them to go to other industry people and other trainers in industries that are already doing this, if they can find them. When I was looking, there weren't a lot of people.
>
> When you go to conferences, and specifically to talks on interactive video, you're going to meet other trainers in other companies. You talk about what they have done, and you share each other's cards. That helped a lot.

Although trainers in some corporations may not be willing or allowed to share information with others, one training developer suggested that the best approach to finding information is to simply "just ask." He commented, "I have been absolutely stunned with how far you can go, if you just go ask for help. People really are friendly, and they want to help."

(2) Be cautious in dealing with vendors and consultants.

Next to direct contacts, vendors and salespeople are recommended most often. However, almost all training developers who recommend vendors as information sources suggest proceeding cautiously. Vendors

are recommended because they may have demonstrations, they can refer trainers to others, and they allow a potential user to find out the basic capabilities of an interactive video system.

The specific cautions in dealing with vendors, salespeople and consultants include the following:

(a) Don't rely on one source or opinion. Look at a variety of systems and software and weigh all of the alternatives.

(b) Confirm everything you hear with several sources.

(c) Look for companies with a "track record," those who have been in the business for awhile. Five years is considered a long time in the industry.

(d) Consider the issues of maintenance and service right from the beginning.

(e) Be careful about the type of technology involved. Changes are rapid, and one should look ahead to see what systems are in development.

(f) Find out the total cost and get a complete, written agreement that includes costs of customization and modifications.

(g) Call around to other trainers and production personnel to find out who is in the business in your area and to learn about their reputation and past projects.

(3) Know your training problems and your learners.

Directly related to these cautions is the recommendation to consider the setting where the programs will be used and the potential

users of interactive video systems. Vendors are viewed more positively by trainers who have clearly identified their objectives and their purposes for implementing interactive video. Their purposes, for example, might include training users to operate expensive equipment or to react in high-risk situations. Such training might require that the interactive video system chosen have powerful capabilities for multiple branching and for keeping accurate records of student responses. In the initial phases of awareness, it is easy to be confused by systems, hardware, and sales pitches. Having clear objectives helps to focus the questions to be asked of vendors, consultants, and others in training departments. Be sure that it will be applicable to your setting.

(4) Look for a match between the training problem, the learners, and the attributes of the medium.

If the objectives for using interactive video are clear and there is a basic familiarity with the attributes of the medium, it is more likely that the applications chosen will be successful. This is not a new concept. However, several respondents cautioned against being overly concerned about the technological aspects of interactive video at the expense of the design aspects.

One training developer gave the following example of the importance of understanding the attributes of the medium and the learners.

> The most important factor about the whole thing is, know who your audience is. You get somebody who thinks that they can go out and say, "Hey, this is great. I'm going to buy it. And we'll find an application for it." Well, does your audience even know how to turn the computer on?

Developing an evaluation process or criteria for investigating hardware options, authoring systems, and consultant services that address the direct requirements of the particular organization and learners is one possible strategy.

(5) Become involved in an actual project as soon as possible.

In order to really learn, once a suitable project has been identified, several subjects recommend becoming involved with a project. A low-risk project is ideal. It is a paradox that some developers suggested starting with a small application that may not even use many of the potential capabilities of the medium. That act of getting started, however, will help one understand the capabilities for later projects. There should be a happy medium between research and development and appropriate applications if possible.

Another advantage of being involved with a project is that it may facilitate the search for information on interactive video. By having an actual project planned or underway, it will be easier to ask questions of vendors, consultants, and colleagues. Also, it is easier to get more accurate responses when the questions are focused on a particular project. In addition, a project adds credibility that may be crucial in getting good advice. Of course, if a poor product that is widely distributed results from this first project, the effect could be disastrous.

The advantages of becoming involved with a project were summarized by one training manager as follows:

> What you really need to do is to actually start doing things. Put a stake into the ground, say, "This is going to be it." Lie if you have to and your mangagement will say, "Is this the stuff that's going to carry us for awhile? Is it compatible? You're sure this is the right thing?" So you lie, and hope that they forget, or you tell them that at the time it was the right thing to do. Because basically you never do know when is the right time, so you never do anything. You end up becoming an expert in knowledge, not in practice or experience, and you never know when the right thing comes along. And then, even if you do, your skill level in being able to capitalize on that is so low, that by the time you get yourself up to speed, it will have changed again, anyway.
>
> So the thing to do is definitely attend, network, read, but as soon as you find a place, put a stake in the ground and go do it. Whatever that stake may be. And resign yourself to the fact that two years from now, you will look back at a relatively bush-league kind of effort, that seemed pioneerish when you did it. . .You will be out of date as far as what's in the marketplace, that's a given. But your ability to speak from experience, to be able to develop the procedures, the productivity tools, and the knowledge to be able to do the job for the 1980's and 1990's will be there. It won't be there if you continually study. All it means is you're going to be well read. You'll be well-versed, and you'll be able to speak like I'm speaking right now forever and ever and ever.

Suggestions and Implications for Information Providers

The suggestions in the following section are drawn from the general conclusions as well as from the specific comments of the information seekers in this study. The recommendations are aimed primarily at hardware and software vendors, consultants, publishers, and organizations. It must be noted, however, that some of the steps suggested may have already been implemented by some of these information providers since the subjects began their information search. The information providers in this context are also in the position of dealing with technological change and innovation, and they progress, as do the information seekers themselves, through developmental phases of

information dissemination and innovation. Some of the recommendations may, therefore, have already been implemented by some information providers with regard to interactive video. These same considerations, however, also apply in disseminating information on future technological innovations for training.

(1) To aid in the diffusion of interactive video, become active in the information-sharing network.

Innovation is dependent on information. The most effective way to provide information to innovators in interactive video appears to be through joining actively in the network. One means of joining this network is to to participate in organizations such as the IICS, ASTD, and ADCIS. Conference presentations and trade shows are another way of becoming involved, as are site visits to demonstrate systems or programs.

Participation in the network can include documentation of projects and publishing articles on completed projects, analyses of costs for specific applications, and methods of development, management, and evaluation.

(2) Tailor information products and delivery to the phases of the innovation-decision process.

Information can be more effective if it is directed and formatted to meet the specific information requirements of corporate trainers interested in an innovation. For example, for information seekers in

the initial phase of innovation-decision, general information on the capabilities of interactive video is appropriate. Demonstrations of the capabilities are particularly effective. As trainers learn about the general capabilities, information can be tailored more specifically to their situations and settings.

Vendors should develop varied descriptions of their products that are increasingly detailed or that include varied examples of the capabilities of their equipment in specific settings.

One training developer suggested that conferences would be more effective if they had "tracks" to accommodate varying degrees of familiarity and expertise with interactive video.

Demonstrations of applications related to specific types of training and specific types of corporations should be developed and made available for trainers to use in discussing interactive video with their management.

Silverstein (1984), in an article offering advice to media managers on implementing videodisc, states:

> It's virtually impossible to convince either your management or your customers of the benefits of interactive video without showing it to them. We're still aware of media managers who are trying to sell disc technology with only memos and brochures. Interactive video must be experienced to be understood. (p. 12)

(3) Emphasize information on specific applications related to the target population

The diffusion of an innovation can be facilitated by sharing information on the applications of interactive video in specific

settings, particularly in settings that are similar, if not identical, to those of the information seeker. Examples of such diffusion activities include the development of lists of individuals willing to be contacted about their products, central information clearinghouses, and electronic bulletin boards.

(4) Be straightforward in discussing systems and services.

Information providers can also influence the adoption of an innovation by the quality of the information they provide. Dishonesty about the capabilities of equipment, subcontracted services, and development and production time can create a frustration that can hurt the chances of continuing use of interactive video in a corporation.

One training developer summarized this recommendation as follows:

> I think the important thing is that people need to represent themselves very honestly. If they're going to broker it, fine. If they're going to manage it, fine. They shouldn't say they're going to do it themselves personally. Just be honest and say, "We don't have that kind of expertise. We can work with you to develop it, and we can work with you to manage it, but we cannot deliver that." Right now, everybody tells you they can do everything.

(5) Do not underestimate the "advocate" for an innovation.

Information provided to a strong advocate for the innovation may pay off in sales sooner than concentrating on potential applications of the innovation in predictable industries. Despite their present job role or corporate position, interested individuals who may not have a specific project at the current time could become involved with interactive video in the future. With a strong information base at their command, they could convince the corporation to adopt interactive

video as a training medium. They deserve the same consideration as individuals with "power and prestige" even from a strictly economic, profit-motivated perspective. In fact, support of small pilot projects that have a chance of being initially successful in demonstrating the potential of interactive video as a training tool may be a primary factor in adoption of interactive video for larger applications at a later date.

Silverstein (1984) in advising media managers who are trying to sell videodisc applications, comments, "Remember that the internal champion is a powerful requirement; nurture his or her interest" (p. 12).

(6) Encourage opportunities for hands-on experience.

Interactive video is an innovation that is not easily visualized without demonstrations and experience. Any support of actual experience is important in information sharing and in facilitating the adoption of the innovation. The adoption can be facilitated by the production of actual programs to demonstrate the capabilities.

Practical information on how to design and produce interactive video programs should be offered by consultants and others as much as possible. Vendors could help facilitate this information-sharing by supporting small development projects either with direct financial assistance or through the loan or leasing of equipment. Centralized information centers or services that would assist in locating funding sources and grants for program applications would also be helpful.

Final Comments

Interactive video is an innovation that requires time and money to develop quality applications. Unless programs are developed and demonstrated that show creative use of the medium's attributes, few training developers are likely to make the effort to promote interactive video in their settings.

Interactive video has a definite appeal to training developers, but the real value of the medium will depend on how effectively it is applied. Information to support and implement effective programs is difficult to find at this stage in the development of the technology. What is required now is for innovators to take the necessary steps to develop their own programs.

It is appropriate to close this paper with the words of several of the training developers who contributed to this study. What they decide to do with interactive video will help determine the future of the innovation. The degree to which they share information on their experiences will also affect the rate at which the innovation is adopted and the quality of future applications. As pioneers of a new training technology, both information providers and information seekers have an opportunity to shape its course. In talking about the problems of innovation and information seeking, they offered the following insights:

> People tend to believe that interactive video is training all by itself, and it isn't. It's an aid to doing something that you're already doing, that will allow you to possibly do it better, or faster, or more conveniently.

It's kind of like playing with a new toy. And so giving a toy to a child, if it's not looked through thoroughly, you don't know whether the toy's going to fall apart, or if there's a sharp edge on it that's going to cut somebody and hurt them. Is the toy going to last? Are you going to be able to use that toy again, after the first time you play with it? And are you going to learn anything by playing with the toy?

It's taking about five years longer than I thought it would. I thought that by 1982 we would be where we will be in 1986. I think by the end of the decade we're going to see some really significant things, but it's going to be a while before we start to see that. We're starting to now, but there are just so many things involved in this, it takes a lot longer.

One of the major problems is that it's very difficult to get good information. And it takes a long time for you to know what questions to ask, let alone get them answered.

People have to really start getting imaginative with the programming, because the programming is going to make it. When you get programming that's really interactive, it probably will work.

My original point of view was that interactive videodisc was so good that it was going to win out eventually, no matter what. And I think it has some capabilities that will inevitably make it effective. The trick is to find the right situation, to have it really catch on.

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APPENDIX I.

INTERVIEW GUIDE

INTERVIEW GUIDE

Name/ID#_____Date_____

Organization_____

Title_____Department_____

Address_____

Telephone_____

Additional

Codes_____

Notes:

I. Introduction:

Explain:

A. Purpose of the study: doctoral research at Syracuse University

B. Study of information seeking on interactive video in corporate settings

C. Interview should take about an hour

D. Repondents will receive a summary of the study results

E. Explain confidentiality--no names, only company types

F. Any questions or concerns before beginning?

II. Context:

First, I would like to have you tell me something about:

A. Your company:

1. Number of employees:

2. Divisions:

3. Type of company/services and products:

B. Your Training Department:

1. History (when instituted)

2. Where it fits in the structure of the organization:

3. What type of training is offered:

4. What people are employed in this department?

What are there roles?

C. Yourself

I would also like some background information on you . . . on

1. How long you have been with the company:

2. What is your highest level of education:

   high school some college B.A. M.A. Doctorate

3. Do you belong to any professional organizations?

   If so, which ones:

   How active would you say you are in these?

4. The work that you do here:

D. Interactive Videc

I understand that you or your company has been considering or have started to use interactive video in you training programs.

I'd like to know more about your department's involvement with interactive video. Can you tell me about what you have done in this area?

1. Stage/level of involvement from awareness to adoption
   (just considering decided to try pilot adopted)

2. Reasons for considering/using interactive video

3. The type of programs being produced or considered (objectives, approach, scope, e. g. procedural learning, simulation))

4. Length of time been considering/using interactive video

5. Type of interactive video (tape, disc, or both)

6. Specific equipment used (computer, video, interface, other)

7. Turnkey (complete system) or individual components

8. How much produced in-house/contracted out

9. Other media used for training, particularly computers and video (integration with other moves toward automation, e.g. data processing)

10. Formal procedure (if existing) for considering or using interactive video

    Is this different than for other programs?

(or)

11. How the decision to consider or use interactive video came about. Who decides whether or not to consider interactive video?

1[illegible]. Who makes the decision about whether to use interactive (or Who has to be convinced before it can be used)

III. Decisions/Problems

In your role, when you were considering using interactive video, what kinds of things did you have to think about?

A. For example, did you have to make any decisions about . . .
   1. Costs

   2. Design

   3. Project Management

   4. Project Teams

   5. Hardware selection

   6. Production

   7. Mastering (for videodisc)

   8. Evaluation

Was there anything else that you had to look into to decide whether to use interactive video?

Once the decision was made, did you have other considerations or problems to deal with? If so, what?

IV. Information Seeking

You've mentioned several things that you had to consider in deciding to use interactive video. I'd like to know something about how you looked into these considerations.

A. First, how did you learn about interactive video originally? Can you recall?

B. Of the considerations in using interactive video that you have mentioned, is there any one that was particularly important to you?

(if not, ask individually about items in III: cost, design, hardware, team, management, production, evaluation, or other item specifically mentioned)

C. Did you go anywhere to find out about this.
*(If subject starts with D or E, come back to C)

For example, who did you talk to about it first? Second, etc?

1. Who (how known, occupation)
2. Why (how known to contact, particular problem or reason)
3. Where (organization/industry)
4. When (number of times)
5. How reached (phone, in person, letter, conference)
6. How helpful? (very--to--not so)
7. Why helpful or not helpful?

D. You may have used some other ways to find out about this. For example did you read anything that was published about this? (If not mentioned, ask about journals, newsletters, reports, brochures, abstracts)

Where did you go first?
1. What?
2. How accessed? (library, subscription, active search/found)
3. Why? (how known, why selected)
4. How helpful?
5. Why helpful or not helpful?

E. Have you attended anything to find out more?
(Ask about conferences, workshops, seminars, professional meetings, classes, conferences)

1. What? (media specific, training oriented, sponsors)
2. How learned about?
3. Why attended?
4. How helpful?
5. Why helpful or not helpful?

F. If you could choose the best way for you to receive information, what would it be. In other words, would you prefer to get information on this from a salesperson, friend, colleague, conference, etc? Do you call, write letters?

Why?

G. If you were going to offer advice to someone in your position who was considering getting into interactive video and wanted advice or help on (specific problem discussed earlier, e.g. costs,) what would you tell them about where to go for information?

APPENDIX II.

INFORMATION RESOURCES

INFORMATION RESOURCES FOR INTERACTIVE VIDEO

Organizations

American Society for Training and Development. Publishes the Training and Development Journal. National Conference. Special interest groups. ASTD, Suite 305, 600 Maryland Avenue SW, Washington D.C. 20024 (202) 484-2390.

Association for Educational Communications and Technology (AECT). Publishes the Instructional Innovator and Tech Trends (new in 1985). Annual conference with COMMTEX exposition. Special interest groups. Electronic bulletin board/network Tech Net. AECT, 1126 16th Street, NW, Washington, D.C. 20036. (202) 466-4780.

International Interactive Communications Society (IICS). Chapters in San Francisco, New York City, and Los Angeles. Offers a newsletter, and monthly meetings. Electronic bulletin board for members in San Francisco. In San Francisco contact c/o Patrick Ford, Level Four Interactive, 330 Townsend Street, San Francisco, California 94107. In Los Angeles, Carol Goodman, acting treasurer IICS, L.A., SONY Video Communications Company, 700 W. ARtesia Boulevard, Compton, California 90220 (213) 537-4300 or Ken Christie (818) 242-4672. In New York City, Vicki Vance (201) 368-5099.

Nebraska Videodisc/Design Production Group. Publishes free quarterly newsletter the Nebraska Videodisc Design/Production Group News, workshops on design and production, and an annual seminar. The Videodisc Design/Production Group, KUON-TV, University of Nebraska-Lincoln, P.O. Box 83111, Lincoln, Nebraska 68501. (402) 472-3611.

Society for Applied Learning Technology (SALT). Annual conferences including Interactive Video West in Los Angeles, Microcomputers in Education and Training, Simulator and Training Technology for Increased Military Systems Effectiveness, and Interactive Video in Education and Training. Publications. SALT, 50 Culpeper Street, Warrenton, Virginia 22186. (703) 347-0055.

Books

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DeBloois, M. ed. Videodisc/Microcomputer Courseware Design. Englewood Cliffs, New Jersey: Educational Technology Publications, 1982. Includes a model for interactive video design based on 13 design principles.

Floyd, S. and Floyd, B. The Handbook of Interactive Video. White Plains, New York: Knowledge Industry Publications, 1982, 168 pp. $34.95. Describes technology, hardware, authoring, design. Offers case studies, and lists mannufacturers, suppliers, and resources. 701 Westchester Avenue, New York 10604.

Parsloe, E. Interactive Video. Researched by Signe Hoffos and the EPIC Team. EPIC, Ltd. published by Sigma Technical Press.

Schneider, E. and Bennion, J. Videodiscs. Englewood Cliffs, New Jersey: Educational Technology Publications, 1980. Covers videodiscs, capabilities, production, applications, and cost effectiveness.

Videodisc Market Survey and Report. Quarry Hill, Inc. P.O. Box 574, Arlington, Virginia 22216. $650.00. Provides a market analysis, and a directory of suppliers, specifications, costs, availabilty of videodisc systems, videodisc components, bibliography of books, articles, conferences, and presentation summaries from 1981-present.

Periodicals

BCD Interact. Links users of BCD interactive video technology and includes a list of projects in progress and notes. Quarterly. Write c/o Dr. Dent Rhodes. Illinois State University, 232 De Garmo Hall, Normal, Illinois 61761.

Interactive Video 1984. Charles Kindleberger. Annual annotated directory of resources, projects, people, organizations involved with interactive video. Includes contact names, addresses, and telephone numbers. Applied Video Technology, Inc., 5118 Westminster Place, St. Louis, Missouri 63108. (314) 569-9144.

Medical Disc Reporter. 5219 Acacia Avenue, Bethesda, Maryland 20814. 1 year at $35.00. and Medical Disc Directory. $100.00 for both and update, ongoing catalog of videodisc projects in all areas of health. Over 60 projects. Quarterly updates at $25.00 per year.

Optical Memory Newsletter. Published six times per year. $295.00 per year. Ed Rothchild, Consultant. P.O. Box 14817. San Francisco, California 94114.

Pioneer DiscTopics. A quarterly industrial newsletter, published by Pioneer Video, Inc., First issue published in January 1985. Available from Pioneer Video, Inc., Industrial Sales Division, 5150 Pacific Coast Highway, Suite 300, Long Beach, California 90804 (213) 498-0300.

Video Computing. Mark Murley, ed. Publisher Richard Kichmond. Computers and video. P.O. Box 3415, Indiatlantic, Florida 32903. (305) 768-2778. $130.00 for 12 issues.

The Videodisc Monitor. Ed. and published by Rockley Miller. 12 issues for $167.00. P.O. Box 26, Falls Church, Virginia 22046-9990. (703) 241-1799, TELEX 4996279

Videodisc News. Ed. Michael Ruddy. Monthly at $65.00 per year. Videodisc Services, Inc. 8027 Leesburg Pike, Suite 710, Vienna, Virginia, (703) 821-0465.

Videodisk and Optical Disk Magazine. Ed. by Judith Paris. Meckler Publishing Company, 11 Ferry Lane West, Westport, Connecticut 06880 (203) 226-6967. Bimonthly. $75.00 per year. Videodisc and Optical Disk Conference and Exposition. Videodisc and Optical Disk and Compact Disk Conference and Exposition.

Videodisk and Optical Disk Update. Judith Paris, ed. Monthly. $96.00 per year. Meckler Publishing, 11 Ferry Lane West, Westport, Connecticut 06880 (203) 226-6967.

Conferences

The Institute for Graphic Communication (IGC). Offers annual 3-day conference on the outlook for optical and video disc systems and applications. $710. 375 Commonwealth Avenue, Boston, Massachusettes 02115.

Video Expo. Offered in New York and San Francisco, annually. Contact Knowledge Industry Publications, 701 Westchester Avenue, White Plains, New York 10604.

Seminars/Workshops

Pioneer Program Development Seminars. Offering six in various cities in 1985. $375.00 for 3days. Also offered to companies at $5000 for 10-25 people. Includes information on planning, structuring, and writing interactive video scripts and storyboards, managing the program development process, planning and controlling production, digital programming and quality control, and justifying the videodisc as a training tool. Participants receive an interactive applications sampler videodisc with 10 case histories of GM, IBM, AMC, McDonnell-Douglas, Maryland Public Broadcasting, and the United States Army. Call Pioneer Video, Inc., Marketing Support Department. (213) 498-0300.

The Parke Institute. Offered six seminars on interactive video in various cities in 1984. Two days for $499.00. Presented by Michael DeBloois. Contact the Parke Institute, 120 Central Park Plaza, 2880 South Main Street, Salt Lake City, Utah 84115, 1-800-2210254, in Utah (801) 486-2384.

Miscellaneous Publications

Dargon, T. Flowcharting--the key to interactive video. Five basic patterns to use in interactive video flow charts. Reprint from EITV. Available from SONY, P. O. Box 29906, Los Angeles, California 90020.

Kozen, N. ed. Annotated bibliography. Performance and Instruction Journal. November-December 1983. 34-35. Lists 29 articles and 2 books on interactive video.

Pioneer Video Customer Support Publications: Currently available products include post-production and formatting information, flowcharting guidelines, flowcharting template, digital programming products, description videodisc manufacturing cycle (diagram) and project milestone planning chart. Available from Pioneer Video, Inc., Industrial Sales Division, 5150 Pacific Coast Highway, Suite 300, Long Beach, California 90804 (213) 498-0300.

Smith, J. How to design interactive training programs. Training. December 1983. 30-41, 44-45.

BIOGRAPHICAL DATA

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Syracuse University
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